ONTARIO MINISTRY OF MUNICIPAL AFFAIRS AND HOUSING

ONTARIO MINISTRY OF ENERGY

CITY OF OTTAWA

ENERGY USE
AND LAND-USE PATTERNS
IN THE CITY

ECTP Study Programme

FINAL REPORT

SYMPOSIUM

City of Ville d' Ottawa

October 1983

INTRODUCTION

In accordance with the City of Ottawa Policy on Energy Conservation and in response to the research grant programme "Energy Conservation Through Land Use Planning" (ECTP) initiated by the Ontario Ministries of Energy and of Municipal Affairs and Housing, the City proposed a research project under the title:

"ENERGY USE AND LAND USE PATTERNS IN THE CITY"

The objectives of this project were as follows: -

1. To establish current (1982) and possible 1992 patterns of energy use and household trip to social and economic opportunity;
2. To formulate more energy-efficient patterns of land use in the City, in order to serve possible 1992 lifestyles;
3. To identify differences between existing and energy-efficient land use patterns.

A survey of 'Energy Use and Household Trips' was carried out in 1982 under Objective 1, to establish a benchmark for the study of lifestyles in relation to energy in the City of Ottawa. As part of the preparations for a second survey under Objective 1, to establish possible 1992 patterns of energy use and household trip, a symposium was held on February 7, 1983, with 12 specialists on various aspects of urban development in the Ottawa region for the following purposes:

a. To gain a perspective on various possible developments in the area between 1982 and 1992, which might have an impact of lifestyles;

b. To allow specialists an opportunity to hear and react to each other's projections for the area, in order to derive alternative development scenarios.

c. To obtain an image of the future reserved for the National Capital, in terms of new facilities, novel means of transport, changes in housing and the urban environment and developments in technology and telecommunications.

The results of this symposium were illustrated on a pictorial map of the City which was used as the introduction to a simulation game. This game was used as a means of investigation into future lifestyles in the area. A brief description of the game will be found in the announcement of the survey published in the OTTAWA CITIZEN and reproduced on the front cover of this report. A full description, together with instructions and illustrations is included in the APPENDICES volume of the report.

Preparation for the Symposium included the formulation of a time frame for projections, a list of concerns about the future and a procedure for presentation and discussion of material. These were indicated in the Programme circulated to the participants, as shown in the pages that follow the Executive Summary.

SYMPOSIUM ON ENERGY, ENVIRONMENT AND LIFESTYLES IN THE OTTAWA REGION 1982-1992

CONTENTS

84- 2891 /

Title .... Page

Introduction 1

Executive Summary 5

DEMOGRAPHIC PROJECTIONS 25
by Barry Nabatian, A.A.S., B.Sc., M.Sc.

HOUSING 31
by Ron Kellestine, B.A., M.A.

SOCIETY, PARTICIPATION AND INFORMATICS 37
by Chris Bradshaw, B.A. (Pol. Sc.)

ENERGY 47
by Gary Armen, B. Arch., M.C.I.P., Ph.D.

URBAN FORM AND STRUCTURE 63
by Nick Tunnacliffe, M.A., M.C.D., M.R.T.P.I., M.C.I.P.

COMMERCIAL DEVELOPMENT 69
by Ray Levesque, M.A. (Econ.), M.B.A.

ECONOMICS 77
by Dan Stankovic, B.A., M.A.

TRANSPORTATION 85
by Louis Shallal, B.Sc., M.Sc., Ph.D.

RAPID TRANSIT 101
by Brendan Reid, B.E., M.Sc., M.I.C.E.

RECREATION AND TOURISM 113
by Jack Wright, B.A., M.A., Ph.D.

POLLUTION 123
by Harry Loijens, M.Sc., P. Eng.

SOCIAL PLANNING 131
by Nadya Tarasoff, B.A., B.S.W., M.S.W.

APPENDIX 135

The account of the proceedings was edited, first by each specialist, to ensure accuracy of recording and secondly, by the chairman of the symposium to ensure relevance and consistence of projections.

The presentations have been kept in the order in which they were given, to preserve the sequence and flavour of the discussions, particularly when cross-references were made from one presentation to another.

The conclusions of the Symposium form the Executive Summary preceeding this introduction.

GARY ARMEN
Chairman of the Symposium

GA:cmm-3
D2D108

SUMMARY OF PROJECTIONS FOR THE OTTAWA REGION: 1982 - 1992

A.	1982 - 1985 PERIOD
Population:	- Continued decrease in household size from 1981 average of 2.7, but at slower pace; - Just over 50% of the annual increase of 7,450 persons is likely to be due to migration and employment growth, while the rest is likely to be due to natural increase; - Ottawa population is expected to be 304,000 to 309,000 in this period, while the National Capital Region reaches 725,000 to 745,000 people.
Housing:	- Owner-occupied homes to rise by 10%; - Supply to be moderate; occasionally even plentiful, due to flare-ups in sub-markets; - Rental market to become less affordable with 8%-10% increase in rents; - Vacancy rates between 0.5% and 1.5%; - High maintenance costs particularly in energy; - Illegal conversions to higher density likely to continue; - Existing public housing stock badly in need of rehabilitation and retrofitting.
Society Participation Informatics:	- Trends towards sharing information with the public; - Electronic means allow people more choice, more pass-times, more outlets; - Working at home experimented with - employers hesitant; - Computers added to most business and residential premises.
Energy:	- Stable prices for oil at the level of $36.00 to $40.00 per barrel;

	- At the gas pump, prices fluctuate between 30¢ and 56¢ per litre due to competition between suppliers; - Dilemma for Canada whether to continue development of local oil resource industry towards self-reliance for the nation by 1990, or to import cheap foreign oil to increase reserves; - Natural gas in plentiful supply but price kept at 65% of oil; - Electricity supply transmission from Ontario Hydro to Ottawa Hydro in critical juncture, as Environmental Assessment Board takes time to decide whether to allow transmission lines -- decision expected by 1985-86. Nuclear debate grows; - Growing interest, but low reliance on renewable energies.
Urban Form and Structure:	- (No projections possible for periods 1983-85 and 1986-88; See forecast to 1992).
Commercial Development:	- (As above).
Economics:	- Firm establishment of 'High Tech' industry; - Continuing generation of new jobs in that industry. Ottawa fares better than nation in employment; - In Central-City and Inner-City areas, revitalization to continue; - Inflation: 6%-8%; Interest rates: 11%-13%.
Rapid Transit:	- Sections of Transitway (Mann Avenue to Riverside Drive and Carling Avenue to Algonquin College) to be operational by late 1983; - Construction of Scott Street section to be operational by 1985;

- Projection of continued increase in ridership on public transit; Current level: 175 trips per head of population;
- Albert Street to become a Transit Mall in 1984 with stations at Elgin, O'Connor, Metcalfe, Bank and Kent;
- Construction of east Transitway, (Riverside Drive to St. Laurent) to start in 1984.

Recreation and Tourism:

- International travel and tourism may continue to decline;
- Emphasis on regional scale of recreation and tourism;
- Cottage: "here to stay";
- Less emphasis on organized activity;
- More family-oriented recreational pursuits;
- Ottawa tourism: 2 million/annum with some 660,000 from outside the region;
- Increase by about 2.0% per annum and likely to rise;
- WINTERLUDE and SPRING FESTIVAL expected to grow;
- Rideau Centre including Conference Centre become fully operational and exert attraction.

Pollution:

- Pollution control strategy being developed for rivers in the area;
- Alternative swimming locations to Rideau River seriously being considered - Gatineau, Rideau Lakes, etc.;
- Mooney's Bay and Britannia to continue as swimming beaches, subject to occasional control or warnings;
- Quebec municipalities expected to start operating sewer treatment systems;
- Along Rideau River, heavy metal levels are below detection level;
- Increase in density of urban population not likely to produce unsurmountable pollution problems.

Social Planning:

- Greater attention to special need and minority population groups;
- 1976-1981 trend towards single-parent families dramatically increasing;
- Single-person households already a growing proportion of the population, may continue to increase;
- Elderly persons also in growing proportion will continue to increase;
- Monitoring system with 100 indicators for 30 'need areas' currently applied by the Ottawa-Carleton Social Planning Council;
- Retraining opportunities in computation and data management also being organized.

B.	1986 - 1988 PERIOD
Population:	- Continued decrease in household size; - Slight increase in rate of in-migration; - Ottawa population may reach 307,000 to 312,000, while the National Capital Region reaches 775,000-795,000 people.
Housing:	- Owner-occupied homes to rise by 6%; - Supply to be moderate to poor; - Rental market continues to be less affordable with about 8% increase in rents; - Vacancy rates vary between 1.0% and 2.0%; - Maintenance costs remain high as energy becomes more expensive; - Moderate escalation in property values; - Improvements in housing renovation and retrofitting technology.
Society Participation Informatics:	- Computer becomes controller of other appliances; - Working at home begins to grow; - Teleconferencing replaces travel between cities, increasingly; - Educational software issued to students for home learning; - Data bases on products, services, etc. accessible at home through computer.
Energy:	- Rising prices for oil between $49.00 and $50.00 per barrel; - At the gas pump, prices fluctuate between 50¢ and 76¢ per litre;

	- Natural gas and electricity also rise at the rate of 10% to 18% per year. Nuclear controversy continues; - Electricity supplies now quite adequate in the region, due to erection of transmission lines by Ontario Hydro; - Growing reliance on renewable energies and passive solar in particular.
Urban Form and Structure:	- (See forecast to 1992).
Commercial Development:	- (As above).
Economics:	- Some decline of recovery trends; - Revitalization of Ottawa downtown and inner suburbs continues; - Inflation: 8%-10%; Unemployment rises to 8% or 9%; Interest rates: 13%-15%.
Transportation:	- (See forecast to 1992); - Renovation of Queensway, including eastern extension may be completed.
Rapid Transit:	- East Transitway to Blair Road completed; - Southeast Transitway between Hurdman Station and Hunt Club Road to start construction in 1985; - Considerable increase in ridership on the growing system; - Projected level: 190-200 trips per head of population.

Recreation and Tourism:	- International travel may,decline further due to rising energy prices; - Trend in family-oriented pursuits tends to grow; - New Art Gallery and Museum of Man (Laurier Park in Hull) completed; - Tourism projected to increase by 2.5% to 3.0%.
Pollution:	- Pollution control strategy now operational; - Some noticeable improvement in pollution levels of Ottawa and Rideau Rivers.
Social Planning:	- Continued growth of single-parent and single-person households; - Slight increase in unemployment creates more problems and opportunities for retraining.

C. 1989 - 1992 PERIOD

Population:

- Smaller decrease in household size appears likely;
- Ottawa population may reach 310,000 to 315,000, while National Capital Region reaches 818,000 to 837,000;
- Annual growth rates over the long-term (1981-2000) may vary as much as 0.8% per annum, hovering between 0.9% and 1.7% - i.e., between 5,000 and 10,000 persons/annum.

Housing:

- Owner-occupied homes projected to be in short supply at only 4% increases;
- Rental market also limited as vacancy rates are expected to be only around 1.0%. Rent controls keep increases to only 6% - no new construction of rental units likely;
- Maintenance costs still rather high as energy prices are stable to rising;
- Investment in housing at minimal level. Higher density, moderately priced housing, smaller units, much in demand. Lot sizes shrink considerably;
- Zoning barricades between high and low density homes, due to political pressure;
- Property redevelopment spreads to suburban areas;
- More incentives to tenants to be energy-conscious;
- Financial incentives for rehabilitation likely to be continued to 1992 and beyond;
- More co-operative forms of housing to increase;
- Greater emphasis on modular construction and building technique improvements for all types of dwellings.

Society
Participation
Informatics:

- Data bases offered as collective services;
- Telecommunications encourage trends from social networking to televoting;
- Electronic realities begin to replace physical realities;

- Home-orientation in economic activity tends to increase feelings of isolation;
- Idea of 'privacy' evolves from spatial sense to information terms;
- Participatory processes evolve fully toward information sharing;
- Emphasis on pluralism and away from seeking a consensus to satisfy majorities.

Energy:

- Stable to rising prices for oil hover between $50.00 and $65.00 per barrel;
- At the gas pump: 80¢ - $1.12 per litre;
- Natural gas and electricity which were at about equal price levels in 1990 (according to Ontario Hydro projections) now may diverge, with natural gas becoming more expensive by 1992;
- Renewable energies expected to rise considerably in demand and supply, as technologies related to them receive increasing government assistance;
- Energy price levels emphasize social and income differences between various lifestyles.

Urban Form and Structure:

- Not many changes in form as 90% of the projected 1992 total urban area is already in place;
- Some 2,300 to 5,800 hectares of new urban development is projected in the Ottawa-Carleton Region to accommodate 40,000 to 90,000 people, taking up some 18,000 to 47,000 new jobs and creating some 35,000 to 53,000 new households;
- Mixed-use development complexes increasingly in evidence, because of advantages in ease of access and convenience, particularly at transit stations;
- More housing units will be required to accommodate smaller households in higher densities;
- Single-family, low-density housing to demand high premium;

- Water and sewer services together with road construction are likely to become a political issue, because they are very costly to supply in the extended urban areas;
- Some nodes along the Transitway - e.g., Eastgate, St. Laurent Shopping Centre, Billings Bridge and South Keys - are likely to become important district centres with high density, mixed development around the transit station.

Commercial Development:

- No significant deviation in federal government policy on civil service employment and decentralization expected;
- Headquarters of some organizations - e.g., Red Cross - may be increasingly attracted to Ottawa;
- Regional shopping centres will continue to attract people, rather than being exchanged with 'computer shopping';
- Office accommodation may grow between 500,000 and 600,000 sq. ft. per year, but not necessarily downtown. New complexes - e.g., Confederation Heights, Tunney's Pasture, etc. - may come about partly through federal government initiative and partly by private enterprise finding new opportunities near shopping centres - e.g., Pinecrest.

Economics:

- Sub-clustering of employment centres in various nodes throughout the Region appears likely, with the downtown area retaining its dominance;
- No massive suburban residential growth, but considerable Inner-City revitalization to continue;
- Inflation rates: 5%-7%; Unemployment rates: 10%-12%; Interest rates: 12%-14%;
- Recessionary period with usage and price controls or other forms of joint economic management.

Transportation:

- Telecommunication to be a complement rather than a substitute for transportation;
- More recreational, shopping and personal travel in proportion to total trips;

- Trip length may increase as the size of the urbanized area grows during the decade;
- Increase in overall trips (in absolute terms) in relation to 1982;
- No congestion level traffic foreseen on the future Ottawa-Carleton road network, by virtue of Transportation System Management actions. Western Boundary Road and Highway 416 to be under construction.

Rapid Transit:

- Entire 30 km length of Transitway is expected to be operational by the early 1990's extending from Woodroffe Avenue in the west to Blair Road in the east and to Hunt Club Road in southeast;
- Projected ridership level: 220 trips per head of population (30%-40% of peak traffic);
- Total investment: $185 m (in 1983 values);
- Total fleet: 750 vehicles.

Recreation and Tourism:

- Ottawa's emphasis on sense of tradition and place is likely to be increasingly appreciated by tourists;
- Retired population increase in proportion to total population (9% in 1983, expected to rise to 11% or 12% by 2015) is expected to have a significant impact on tourism and recreation in Ottawa;
- Day trip recreational outlets in the region increasingly in demand;
- Recreational facilities to be included in private residential (including high rise) development at an increasing scale;
- Sharing of space in facilities for a variety of recreational, entertainment and social activities;
- Recreation to be seen as a means towards self-development and self-fulfillment;
- Significant input in downtown area for visitor attraction;

- "Mile of History" promenade;
- Considerable revenue likely from "tourist dollar".

Pollution:

- Ottawa and Rideau Rivers could be significantly cleaner by 1992 (despite increase in urbanization) due to pollution control measures.

Social Planning:

- More services likely to be created for the elderly and the disadvantaged;
- Retraining services also likely to be extended and expanded as unemployment increases and "high-tech" jobs increase;
- Attention to needs of underprivileged minorities (e.g., female-led households) likely to increase;
- Other lifestyle groups in need of greater care by the late 1980's may include:-
  - The handicapped (physically and mentally);
  - The institutionalized;
  - Less mobile section of population;
  - Low-income groups;
  - The elderly.

GA:baw-3
D2D110

SYMPOSIUM

ON ENERGY, ENVIRONMENT AND LIFESTYLES IN OTTAWA

1982 to 1992

PROGRAMME

Objectives

- To outline trends in social, economic and physical development in the Ottawa area to the year 1992, considering projections in three phases: 1983-85; 1985-88; and 1988-92;
- To outline trends in lifestyle change for various socio-economic groups in Ottawa during the above three phases.

Method

- 12 specialists meet in a round-table discussion to present their views on the following topics:
    - Demography, Society, Participation, Government
    - Energy, Economics, Informatics, Transportation
    - Urban structure, Housing, Commerce, Industry, Pollution
    - Built environment, Countryside, Recreation, Tourism.
- Each specialist presents his forecast in three phases as indicated above.
- Dialogue between the specialists at each session will be encouraged towards consensus;
- All proceedings will be recorded and distributed to the specialists.

Date	Time	Place
Monday, February 7, 1983	12:00 noon to 2:30 p.m.	Committee Room 'A' City Hall

GA:agb-2
D2D030

SYMPOSIUM

ON ENERGY, ENVIRONMENT AND LIFESTYLES IN OTTAWA: 1982 to 1992

FORMULATION OF QUESTIONS

As part of the ENERGY-USE AND LAND-USE PATTERNS IN THE CITY project, a series of scenaria on energy scarcity have to be formulated, in order to investigate their implications for Ottawa lifestyles. Planners specializing on some aspect of the urban fabric in the City were invited to list questions that they would like to see discussed by the specialists invited to the Symposium and the following list of questions was formulated.

GRID FOR THE GENERATION OF QUESTIONS

A. FORESEEABLE CHANGES IN THE OTTAWA AREA

	Social	Economic	Physical	Lifestyle
(i) By 1985	?	?	?	?
(ii) By 1988	?	?	?	?
(iii) By 1992	?	?	?	?

SPECIALIST CONCERNS:

- Demography, Society, Participation, Government.
- Energy, Economics, Informatics, Transportation.
- Urban structure, Housing, Commerce, Industry.
- Built environment, Countryside, Recreation, Tourism, Pollution.

PLANNING BRANCH MEMBERS FOR THE FORMULATION OF QUESTIONS

1. Barry Nabatian (Demography)
2. Sam Fulton (Recreation)
3. Dan Stankovic (Economics)
4. Murray Chown (Urban Policy)
5. Pat Chen (Urban Design)
6. Lloyd Phillips (Land Use)
7. Arun Mhatre (Transportation)
8. David McDonald (Society)
9. Stan Wilder (Housing)
10. Grant Peart (Recreational facilities)
11. Eric McSweeney (Building/Impl'n.)
12. Gary Armen (Energy)

GA:agb-2
D2D016

CONCERNS ABOUT THE FUTURE BY 1992

(i) Economic Development Concerns

E1 What energy resources (by type) will be available at affordable prices in the region by 1985, 1988 and 1992?

E2 If energy consumption is reduced by various percentages, what will be the respective impacts on the economy?

E3 What is the relationship between energy consumption and employment in terms of reduction and impact?

E4 To what extent would energy-efficient products and services generate new employment?

E5 How will government revenues be affected as a result of reduced use of energy on the one hand, and the new products and services on the other?

E6 How will energy constraints affect business location decisions within (i) the municipality and (ii) the National Capital Region area?

E7 What are the economic considerations in building private and rental housing to meet high energy performance standards?

E8 Are nuclear stations likely to be necessary around Ottawa?

E9 What inventions could be expected to become operational in the Ottawa area by 1992?

E10 How do you see the employment levels developing in the Ottawa area over the study periods?

E11 Could you foresee the development of new energy technologies in the area - gasification of coal, solar technology, peat generation of electricity, etc.?

E12 How would these technologies, related with energy, affect transportation methods, industrial location, level of pollution?

(ii) Social Development Concerns

S1 Is the rate of household formation likely to rise - and by how much - over the periods of 1983-85; 1986-88; 1989-92?

S2 What is the birthrate likely to be in each of the study periods? (1983-85; 1986-88; 1989-92)

S3 What population figures could be assumed for the National Capital Region by 1985, 1988 and 1992?

S4 What population figures could be assumed for Ottawa-Hull as a whole by 1985, 1988, and 1992?

S5 What will be the proportion of retired people to the total in the City of Ottawa by 1985, 1988 and 1992

S6 Futurists envisage 3 social classes by the 1990's: The Achievers, The Frugals and The Survivors. Would this apply to the Ottawa region as well?

S7 What will be the impact of restricted energy supplies on:
- Poor vs. Rich Households;
- Large vs. Small Households;
- Educated vs. Less Educated Households.

S8 What percentage of the population will be able to find home-based job locations as a result of the information revolution, and how will it affect family lifestyles?

S9 If lower income groups have minimized their energy consumption, should we be taxing higher income groups for their higher level of energy use consumption? Is an 'energy tax' likely to be imposed within this decade?

S10 What forms of recreation will be popular in 1992 and what form of energy will they require?

S11 How will energy costs affect opportunites for leisure activities?

S12 Is public participation likely to increase in: -

Municipal Government matters?
Provincial Government matters?
Federal Government matters?

S13 Is the use of energy likely to be rationed during the decade to 1992?

S14 Would any new status or delineation of the National Capital Region affect lifestyles in the area?

(iii) Physical Planning Concerns

P1 What are the energy-consumption implications in a dense vs. spread out types of development in this region?

P2 Will the urban form change as a result of the above? Is suburbanization likely to continue?

P3 Will technological advancements in communications counterbalance the impacts of energy constraints and if so, how?

P4 What are the implications of energy constraints on intra-urban travel? e.g., greater reliance on public transit?

P5 How will energy costs affect modes of transportation and commuting?

P6 Are new satellite communities around Ottawa likely to be built within this decade?

(iv) Concerns About Future Lifestyles

L1 In what ways could we influence the environment to serve lifestyles and minimize expenditure on energy?

L2 Would it be more effective in the long run to change lifestyles, or to change urban structure?

L3 Could local implementation of district heating in new development areas be expected by 1985, 1988 or 1992? What are the implications for various lifestyles?

L4 Since transportation is the single largest component in the energy pie, should we suggest to people of various lifestyles how unnecessary trips can be eliminated - e.g., by substitution and other means?

L5 What should be our objectives in the face of foreseeable environmental, economic, social and lifestyle changes in the short (1985), middle (1988), and longer term (1992) in the future?

L6 What new inventions could we expect to see becoming operational in this area by 1985, 1988 and 1992? What would be their implications for various lifestyles?

L7 Is apartment style living likely to increase?

L8 Are lifestyles modelled on the conserver ethic likely to increase during the decade?

L9 Is car ownership likely to decline by 1992?

L10 Is the standards of living likely to rise over the study periods - for the rich, the middle and poor classes considered individually?

L11 What is likely to be the impact of the following actual or speculative inventions on lifestyles in the Ottawa area?

INVENTION	YEAR
- 14-day weather forecast	(1980)
- Teaching machines (language, etc.)	(1980)
- Inexpensive contraceptives	(1980)
- Instant translation equipment	(1980)
- Two-way computer terminals (Teledon/Oracle)	(1981)
- Medical services at home by two-way electronic monitoring	(1982)
- Pay cable TV	(1982)
- Human skin pigmentation	(1985)
- Synthetic blood	(1985)

- Pain control	(1985)
- Complete weight control	(1985)
- Chemical control over senility	(1985)
- Increase in government employment	(1985)
- Self-repair computers	(1985)
- Artificial hands with sense of touch	(1989)

- Electric vehicles (non-polluting)	(1990)
- Human organ transplants	(1990)
- Elimination of venereal diseases	(1990)
- Social relationship drops (sex, joy, etc.)	(1990)
- Mechanical humans (robots)	(1990)
- 3-D Television	(1991)
- Perception accelerators for retarded	(1992)
- Reduction of necessary sleep required	(1992)
- Household robots	(1992)
- 1 month earthquake prediction	(1994)
- Solar power satellites	(1998)

- Radio stimulation of the brain	(2000)
- Human intelligence artificially increased	(2000)
- Human cloning	(2000)
- Psychochemical control of criminal behaviour	(2000)
- Access to outdoor recreation by permit only	(2000)
- Power transmission by laser	(2000)
- Prevention of mental retardation	(2010)

- Large-scale fish farming	(2012)
- Replacement organs from specially-bred "animals"	(2015)

- Intelligent animals for low-grade-labour	(2020)
- Man-made islands for recreation	(2020)
- Guaranteed income for all	(2024)
- Extraterrestrial farming	(2024)

- Contact with other planets and life forms	(2030)

- Personal hovercraft for commuting	(2050)
- Elimination of water pollution	(2050)
- Suspended animation by cryogenics	(2050)

- Space-time distortion at will	(2060)
- Instant educator machines	(2060)
- Gravity control for mid-air suspension	(2063)

- Artificial life	(2070)
- Light-speed space aircraft	(2075)
- Machines more intelligent than man	(2080)
- Matter transmitter (energizer)	(2090)
- Replicator of objects	(2090)
- Men meet first extraterrestrials	(2100)
- World brain	(2100)

References: ALTERNATIVE FUTURES FOR ENVIRONMENTAL POLICY PLANNING (U.S. Environmental Protection Agency)

PROFILES OF THE FUTURE (by Arthur C. Clarke)

BUY JUPITER (by Isaac Asimov)

FUTURE SHOCK and THIRD WAVE (by Alvin Toffler)

WORLD FUTURES (C. Freeman and M. Jahoda, eds.)

THE NEXT 10,000 YEARS (Adrian Berry)

NAVIGATING THE FUTURE (Bruce C. Murray)

GA:agb-2
D2D031

SYMPOSIUM ON ENERGY, ENVIRONMENT AND LIFESTYLE
1982-1992

Are YOU interested in the FUTURE of the National Capital...?

Are we likely to see RESTRICTIONS in the availability of energy?

What will be the effect of such restrictions on OUR lifestyles...?

Will PRODUCTS and SERVICES related to energy efficiency generate NEW EMPLOYMENT in this region...?

Come and hear some of the answers...and participate in a discussion on OUR FUTURE...!

Monday, February 7th
Meeting Room A
12 to 2:30pm

Specialists will present their views on:

- Society .....Government.....Participation
- Energy .....Economics.... Informatics
- Housing ....Commerce.....Industry
- The City.... The Country.... and Tourism.

SYMPOSIUM SUR L'ENERGIE, L'ENVIRONNEMENT ET LES MODES DE VIE
1982 - 1992

Vous intéressez-vous à l'avenir de la capitale nationale...?

Somme-nous susceptibles de voir imposer des restrictions sur l'accèss à l'énergie...?
Quelle sera l'incidence de ces restrictions sur notre mode de vie...?

La région bénéficiera-t-elle de la création d'emplois liés à des produits et à des services qui ont pour but l'économie d'énergie...?

Venez entendre les reponses a ces questions...et participer a une discussion sur notre avenir energetique...!

du lundi 7 février
salle de réunion A
12h à 14h30

A cette occasion, spécialistes se prononceront sur:

- la société ..., le gouvernement..., la concertation
- l'énergie..., l'économique..., l'informatique
- l'habitation..., le commerce..., l'industrie
- la ville..., la campagne..., et le tourisme.

DEMOGRAPHIC PROJECTIONS

by Barry Nabatian, AAS, B.Sc., M.Sc.

Senior Planner,
Information and Research Section,
Information and Operations Division,
Planning Branch,
Community Development Department
City of Ottawa

BARRY NABATIAN was educated in arts, physics, urban planning, statistics and systems development. He has worked with Decision Sciences Corporation in Philadelphia. He joined the City of Ottawa in 1974.

DEMOGRAPHIC PROJECTIONS

by Barry Nabatian, AAS, B.Sc, M. Sc.

What I thought I would do is to give you a brief background as to what the population numbers and the most recent projections have been in this area and on the basis of recent projections, what rate of growth are we likely to experience in our area.

The National Capital Region's population in the last ten years has increased from approximately 620,000 in 1971 to 718,000 in 1981, all based on the Census figures. The rate of population growth has been among the highest in the nation: On average, we have been experiencing growth in the order of 7 to 7½ thousand people per year. But what is more important, as it relates to energy matters, is the formation of households. The rate of household formation has been much faster and much higher, because not only new households have been formed by the increasing population, but also because of the drop in household size. The average household size in this area has declined from 3.5 persons per household in 1971 to 2.7 persons per household in 1981 and it is still dropping although the rate of decline has somewhat slowed down.

One other factor which is really important about this, is that on average, a little over 50% of the population increase has been due to migration based on employment opportunities. In other words, within the base population itself, the difference between births and deaths has been creating an increase in the order of 3,500 persons per year. The rest of the 7,000 annual growth has been the result of migration into the National Capital Region. But because of this latter factor, it is very difficult to make an accurate prediction about the population of the Ottawa area. The reason is that it is difficult to know what the employment situation is going to be and also what is going to be the age-group-make up of immigrants from the rest of Canada, as well as international immigrants, into the National Capital Region.

I have selected three population projections for this area, one made by C.M.H.C. in 1981, one by R.M.O.C. in 1980, and one by the City of Ottawa, using our SCOPE simulation model system. The range of growth for this area for, say 1986, is between 775,000 to 795,000, a difference of 20,000 people. This amounts to basically over 6% growth in the five-year period 1981-1986 and by 1990 the population is expected to grow to anywhere from 818,000 to 837,000, i.e., a total of another 6% from 1986 to 1991. Basically, we are expecting annual growth rates of slightly over 1% in the National Capital Region for the next ten years.

I think that is enough statistics for the time being. Perhaps at Question Time we can discuss some aspects of all these projections.

POPULATION PROJECTIONS FOR OTTAWA-CARLETON: 1981-2001

NO.	PROJECTION MADE BY	DATE	METHOD	1976	1981	CHANGE PER YR. 76-81	1986	CHANGE PER YR. 81-86	1991	CHANGE PER YR 86-91	[illegible]	CHANGE PER YR 1991-2001	TOTAL GROWTH 1981-2001	ANNUAL GROWTH (1981 — 2001)	
														%	NUMERIC
1.	ONTARIO GOVERNMENT (TEIGA)	1976	STRICTLY DEMOGRAPHIC	ACTUAL POPULATION 520,500	575,000	2.1 %	612,000	1.3 %	N.A.	N.A.	[illegible]	N.A.	172,000	1.5 %	8,600
2.	ONTARIO GOVERNMENT (TEIGA)	1979	STRICTLY DEMOGRAPHIC		553,000	1.2 %	582,000	1.1 %	605,000	.8 %	[illegible]	.7 %	97,000	.9 %	4,850
3.	CMHC. *	1981	STRICTLY DEMOGRAPHIC		554,000	1.3 %	585,700	1.0 %	616,100	1.0 %	[illegible]	.9 %	116,000	1.1 %	5,800
[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5.	R.M.O.C.	1980	EMPLOYMENT DEMOGRAPHIC		553,900 580,300	1.3 % 2.3 %	585,300 638,500	1.1 % 2.0 %	608,400 692,100	.6 % 1.7 %	[illegible]	.4 % 1.3 %	79,000 202,000	.7 % 1.7 %	3,950 10,100

* PROJECTIONS MADE FOR THE OTTAWA-HULL AREA. OTTAWA-CARLETON'S SHARE IS ASSUMED TO BE 75 %

HOUSING

by Ron Kellestine, B.A., M.A.

Market Analyst,
Ottawa-Carleton Region,
Canada Mortgage and Housing Corporation

RON KELLESTINE was educated in English and history and he has held positions as social animator, research analyst and technical writer. He was the planner responsible for housing policy in the City of Ottawa, before he joined CMHC as a market analyst for the Ottawa-Carleton region in 1982.

PREDICTIVE SITUATIONAL MATRIX

The Economy, Energy Prices, Housing Activity
Ottawa-Carleton

SUBJECT AREA	1983 - 1985	1985 - 1988	1988 - 1992
1. The Economy			
INFLATION	6 - 8%	8 - 10%	5 - 7%
UNEMPLOYMENT	6 - 7%	8 - 9%	10 - 12%
INTEREST RATES	11 - 13%	13 - 15%	12 - 14%
GENERAL	Ottawa better than national but only comparative rather than boom.	Decline of recovery leading into another inflationary - recessionary cycle	Recessionary period, with wage & price controls, or other forms of joint economic management.
2. Energy Prices			
OIL	Stable to minor decline.	Rising from 1986	Stable to rising
OTHER SOURCES	Rising	Rising	Stable to rising
3. Housing Activity			
(a) OWNERSHIP			
- prices	8%	6%	4%
- general	Moderate to good	Moderate to poor	Poor
(b) RENTAL			
- rents	8 - 10%	8%	6%
- vacancy rates	1.5 - 2.5%	1 - 2%	1%

HOUSING

by Ron Kellestine, B.A., M.A.

Assuming the rates of growth and interest shown on the attached Predictive Situational Matrix, my general comments on the basic demographic, financial and technological frameworks affecting residential activity over the 1983-1992 period, would be as follows:

(1) Lower overall demand for housing

Population growth will be slow, household formation will be reduced by high unemployment and re-current economic uncertainty. Increasingly, the rental housing market will be defined by lack of affordable housing and not a general lack of availability, until later in the 1980's, just as the general levels of other economic expectations will change to meet less ambitious levels of production and consumption. Capital invested by the private market for rental housing without government incentives has been almost non-existent in Ottawa-Carleton since 1977. The declining value of rental housing as a source for investment profit will shrink the size of the market even further.

The single family market will continue to grow, but at reduced levels from past times with various sub-markets having periods of short-term consumption flare-ups for say, 6 months or a year. Speculative building will continue in its present half-disappeared state with small volume activity occuring in the sub-market booms.

(2) Higher demand for moderate income housing

Trends over the last ten years have had the effect of severely reducing the number of housing units affordable to households in the bottom 25% of the local (Ottawa-Carleton) income distribution scale. Inner city growth and rehabilitation trends saw the lowest cost housing stock blown away in the wind of market escalation of values of inner city residences.

Provincial refusal to build or allow rent-geared-to-income projects, and the reliance on non-profit and co-operative units as the primary direct delivery tool (with some private market rent supplementation) has led to massive build-ups of low income housing need. Increased pressure on local services results, as it becomes more desperate for people on direct government incomes to survive within the rental market.

A general escalation in property values has led to many present rental housing sites being worth far more than the building occupying the land with the present and future likely outcome of elimination of affordable rents, at the lower end of the rent scales. All rents come closer together at higher levels (regardless of time of purchase) counting appreciated land values as costs - without a corresponding tax - thus making new dwelling units more expensive.

(3) Higher development density, smaller unit sizes

In general, a minor, but very evident trend to smaller units, regardless of income or tenure can be seen. Luxury condos or lavish single family estate homes are less overwhelmingly opulent, though of comparative grandeur in these times of economic recession.

Lot sizes are shrinking, the shape of the dream home often shaped by economic reality for consumers; builders looking for the effective demand; and governments providing the services infrastructure. Intellectually, they all recognize the energy conservation benefits possible from increased development densities, but the short-term political pressures of privileged neighbourhoods have resulted in the erection of zoning barricades to the construction of new higher density dwelling units, or the alteration of existing dwellings to create more housing.

The pressure for higher densities will be particularly intense in the City of Ottawa, as its shrinking stock of vacant land disappears. Up-zoning battles are now being fought in the suburban cities of Nepean and Gloucester. Illegal conversion of existing housing will probably rise.

Pressure for higher density building will ultimately result in zoning alterations of slow, but undoubted significance, as the urban social and capital investment patterns readjust to new economic growth patterns, which are now struggling to emerge. Property redevelopment will rise in suburban parts of Ottawa and Nepean, as the present residential stock ages and new market values of land result in the need - and wish - for the realization of more intensive and better uses.

(4) New technological and energy demands

Energy costs have been forcing most sectors of society to find ways to conserve energy in the employment, transportation and residential environments.

Lower income persons have less to worry about any impulse to use high energy consumptive devices, since they cannot afford too many. High maintenance costs for public housing will probably lead to low maintenance levels of housing, which was not built to high standards in the first instance. Low maintenance of buildings will be a problem, especially as these buildings reach the 15-20 year age period, towards the end of the Eighties.

Ottawa-Carleton has a large stock of existing public housing which is not energy-efficient and will be in need of rehabilitation. Rehabilitation technology for the improvement of modern multiple structures is not well developed, since high-rise apartments are not generally old enough to have reached the stage where costly maintenance is required.

If costs of improvements are too high, lower conditions of residential occupancy will result. Alternatively, re-development will be an attractive option.

By the end of the 1980's there will be even more need for energy conservation measures and the pressures of reality have provided a better understanding of ways to give longer physical life to the modern multiple-unit structures, built after 1960.

Tenants will have more reasons to be energy-conscious, as landlords will increasingly charge a basic rent with individual metering of energy costs, leading to direct payment by the tenant. Financial incentives for owners, tenants and landlords to apply rehabilitation to dwelling units, should therefore be continued with more direct targeting of incentives within programmes.

Application of enforced building standards has been increasingly applied by all levels of government throughout the Twentieth Century. This has resulted in improved health and safety standards and at the same time, increasing construction and repair costs for housing. It has also lowered the ability of moderate income groups to build their own shelters on a gradual basis, as their income allows. More co-operative forms of residential construction, based on modular techniques would seem to be a growing source of building interest. The basic means of constructing various scales of housing has not yet undergone the resolution of all practical considerations, but the process will undoubtely continue as the Eighties progress.

SOCIETY, PARTICIPATION AND INFORMATION

by Chris Bradshaw, B.A. (Political Sciences)

Community Relations Officer,
Public Participation Group,
Planning Department,
Regional Municipality of Ottawa-Carleton

CHRIS BRADSHAW was educated in political sciences and has held positions with the Canadian Council of Social Development and the Canadian Organization of Public Housing Tenants. He was the President of the 'Friends of the Future' society in Ottawa in 1981-82. He joined the Regional Municipality of Ottawa-Carleton in 1974.

SOCIETY, PARTICIPATION AND INFORMATION

by Chris Bradshaw, B.A., (Political Sciences)

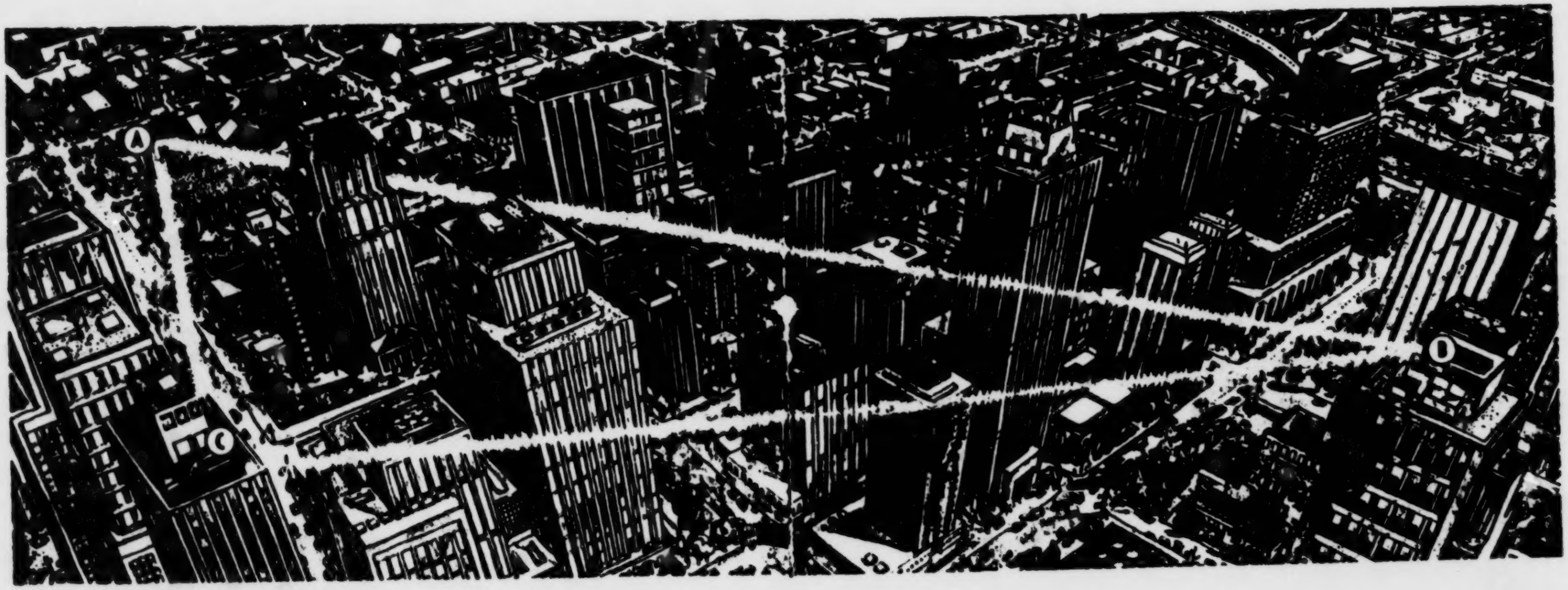
It sounds very interesting to talk about the future of the process of decision-making, as it affects the public and at the same time talk also about the future of the information technology. I see these two subjects converging in very interesting ways.

I think I will address myself first to citizen's participation in general. We are seeing now - some ten years after the peak of citizen's participation - a period of realism about approaches to the public. Citizens are more reluctant to give of their time to participate. In addition, there are so many opportunities to participate that the number of citizens who are interested becomes very thin. It is becoming a requirement for agencies wishing to consult with the public, that they reach out to the community and adopt a very focused approach in the way they do it. We at the Region, for instance, are working on a less formal, more focused process.

I think that a shift is occurring on the part of public decision-makers, away from the powers of an agency to make decisions and more in terms of passing some of the power and the responsibility to the community to make decisions. I think we are going to see participation revolving not so much on the seeking of approval from the public for the government to do things the way it wants, as in terms of information sharing. We may be looking for information from the public to help us with our decision-making, but the public is simultaneously looking to the government as to the reasons for seeking that information. Many different agencies wish to obtain information on demographics without divulging what the agency is planning to do in the future, in order to allow the making of its community plans. When I say 'community', I am talking about community associations, interest groups, business associations, right down to the individual.

The information technology is coming along to help about the time when we are running into the problem of how to carry out a meaningful consultation process at the level of getting information, as well as allowing the public to understand the context and comment on plans. As our work is getting more technical, we shall need to help the public to understand. I think that the new technology is allowing us to make information available in an open-ended way and solicit information more easily. We see this trend, for instance, with many large organizations that sell access to their data banks. This is becoming as important as representing members' interests in policy making. The information includes access to journals, libraries and as well as data bases. Many of these data bases, by the way, are transferred to collective services as in the case of DIALOG - the Lockheed Corporation's system - allowing any one of its members or the public to obtain access.

I think that we are going to see an emphasis away from the idea of concensus building and cooperative decision-making, towards information sharing. This may form the basis for recognition that each entity within society is unique and free to make its own decisions, touch base with other interest groups and share information with any agency.



Conference Telephone for Use By Individuals or Groups Offered

C10 conference telephone offers the convenience of a hands-free telephone and a teleconference terminal. It is designed for use in individual offices or with groups in moderate sized conference rooms. The quasi-duplex audio system features an adjustable electret microphone that provides legible pick-up within 15 feet or more of the unit. Receive AGC assures that the called party can be heard even with low quality transmission.

Oakland's Fire Department Will Use CAD System for 23 Stations

The City of Oakland's Fire Department will soon be using Wismer & Becker's Computer Aided Dispatch System (CAD) which is designed to meet the needs of the city. The CAD system will allow a dispatcher to coordinate the activities of Oakland's 23 fire stations from one central location. This system will allow a dispatcher to locate the nearest available equipment and get it to the scene of the emergency in the quickest manner possible.

The central dispatcher will notify the appropriate fire station of an emergency call by means of radio communication. Each station will also be equipped with a printer that records the same information on paper and this information is available to the firemen as they leave the station.

Each emergency vehicle will be equipped with a mobile status unit which automatically informs the central dispatcher whether the vehicle is on standby, enroute to an emergency, at the scene, or returning to the fire station.

Wismer & Becker has installed similar CAD systems for the fire departments in Houston and Edmonton.

Intelligent Phones in 1992 Will Make Up 10 Percent of PBX Sales

By 1987, at least seven PBX manufacturers will offer Personal Computers instead of ordinary telephone sets to work with their telephone systems. The devices, called "intelligent telephones," will be used in lieu of ordinary telephone sets by five percent of all telephone users on new, large PBXs sold in five years. In 1992, intelligent telephones will account for 10 percent of all new PBX instrument sales.

According to a new study entitled the "Ten Year Market for Personal Computers" by The Eastern Management Group of Morris Plains, New Jersey, the intelligent telephone is a personal computer, complete with a telephone handset and dialing pad. The device utilizes a 12 inch monitor and places a substantial amount of applications software in the hands of the white collar user. The intelligent telephone delivers real processing power to the white collar worker according to the report. It is the first self-contained device to truly integrate voice, data, text and graphics processing.

Six years ago, no one even thought about a desk computer for office workers notes Gregory Blundell of The Eastern Management Group. Today, almost two percent of the office force uses one every day. By 1992, there will be over 10 million personal computer sales annually, with intelligent telephones accounting for over $600 million in revenues.

For further information on the report contact *(201) 267-3700.*

THE ULTIMATE
CORDLESS PHONE

- **Have you ever felt "tied down" to the phone in your office, or at home . . . expecting that important call?**
- **How many times have you made a mad dash for the phone . . . only to find it's stopped ringing?**
- **And what about those occasions when you were simply too far away to hear it ring?**

Compare Our Price and Quality

Only $189.00

(Includes shipping & Insurance)

INTERSTATE PHONE REMOVES THE CORD
. . . and you have **freedom of phone movement** like never before! Your phone goes where you go! Take it from room to room — anywhere in your office. Take a break in the patio, pool or garden. Work way out in the garage, basement or driveway. The Interstate Phone is there at your side.

EXTENDED RANGE
Here is truly the ultimate in cordless phones. The Interstate Phone has unbelievable sound fidelity — with an extended range of up to 600 feet. The entire unit — 10.5 ounces — attaches lightly and easily to a belt, or slips into a pocket. Yet you can receive or place calls to any corner of the world.

YOU OWN IT
The Interstate Phone is wholly independent of the phone company. Even its installation. FCC registered and U.S. Government approved for direct connection to any existing phone jack. Installation and monthly charges are eliminated.

STILL MORE FEATURES
The Interstate Phone unit includes everything you need: Phone • base station • compatibility with all rotary or pushbutton systems • easy installation with standard phone jacks.

MEMORY SYSTEM
The last number called is stored in the memory and is **automatically redialed** — just push **one** button — great to reach forever busy numbers — saves redialing a string of codes.

BATTERY RECHARGING CORD
Still another Interstate Phone **exclusive!** A great new way to keep your phone charged — with no need to return it to its base unit. A **charge cord** is provided, to plug into any AC outlet in the house. Which means the base can be tucked permanently out of sight AND the phone is anywhere you want it — being charged.

GUARANTEE satisfaction is completely guaranteed! Use the Interstate Phone for 15 days in your office, or home. Not pleased? You owe nothing — not even an explanation. Just return for complete, prompt refund. Please note: Equipment used for business purposes is tax deductible. You have everything to gain, and nothing to lose (in fact, you'll wonder how you ever got along without one).

I think one of the most intriguing issues in terms of energy is the element of density in the urban environment. It seems to me that information technology presents two possible scenarios. One is that people will be able to live in a more compact society in the sense that you can now create a sense of space and privacy through electronic means, allowing people to use less space. People may become increasingly home-oriented and change their idea of privacy from spatial to information terms.

I therefore think that we are likely to see more and more people creating electronic realities, rather than rely on physical realities. I believe this is an important trend. The fact that we can now work at home, shop by computer, even have our illnesses diagnosed to a certain extent by computer, means that there is likely to be much less travel. If people do not have to be in a particular place in order to get a particular service or product or job, then we may see a continued dispersal of population. I think that technological and demographic trends are pointing towards a lowering of densities at the very time when we presume that awareness of energy problems might lead to higher densities.

These are two alternative scenarios:

i) that electronics will allow us to live closer; or
ii) that they will allow us to be more dispersed.

I don't see a way of resolving this one way or another at the present time. I won't go into more detail, but I think that in ten years' time we are going to see electronic shopping, work terminals at home or possibly, even district work centres within walking distance, as viable parts of our environment.

QUESTIONS

QUESTION: As regards electronic shopping, another scenario might be the generation of additional trips. For example, someone on a shopping trip may pick-up five things and bring them all in his car, in a single trip. But if this were done by electronic shopping, you may end up with five delivery trucks coming to the same house to deliver the purchases.

ANSWER

Yes that is a possiblity. However, we may find that the technology will allow us to integrate delivery systems to make delivery trips more efficent. Technology brings along its own new set of possibilities and triggers a new economy of doing things efficiently.

QUESTION: It seems to me that income and other lifestyle factors which create differences between various socio-economic groups may come to be emphasized by the technology that you described. Not everybody, for example, will be able to afford the computer - and shopping by computer takes some time to penetrate through various layers of society. Therefore, this dispersion may be more gradual and the five trucks coming to one house may be the ultimate as regards the luxury of enjoying one's riches. Not many people, I think, will be able to afford that kind of luxury for a long long time to come. Do you agree?

ANSWER

Well, there are two reservations:

a) The cost of technology is coming down with some employers actually picking up part of the costs. A number of computer firms in Ottawa, want their employees to be experiencing the new technology. They are agreeing to pay half to two-thirds of the cost of a product for this purpose; and

b) Computers used to require some patience and intelligence to be operated. That has changed considerably in the last years and promises to change quite a bit in the future, to make them easier to use, more "user-friendly".

As regards dissemination of computers, I think most people will come into the technology through networks. They will get it, not so much to do computing, but to obtain services and access to information and listings. I can see a service that would provide T.V. listings, organized like a data set so that if you wanted to show something to a favourite person of yours, you could look it up. Right now, the information is organized only by time and day and it is almost impossible to find information on any other kind of basis. People are spending less time before T.V., and they are going to want to be more selective about it.

QUESTION: You mentioned participation and that of course touches on government and I wonder if easier access to information, media and ways of using information could have some implications on future forms of government. Do you see any particular tendency? Shall we become more democratic, more participatory? We all hope that the future lies in more participatory government, but we hear of pessimistic novels, "1984" and all that. What do you feel?

ANSWER

That is a really big question. I think the term "participatory" refers to a situation that will, in fact, soon disappear. Participation means that the decisions still have to be made at a senior level and all these hundreds of thousands of people down here are going to be influenced by them. It is not realistic to expect the citizen to influence the decision making at all levels. Technological improvement of many services, down to the lowest level, is helping people to relate to plans in a more natural way.

If you have 100,000 people trying to participate in one decision, you will have to formalize it much more, than if you had many small community groups. There is a natural built-in informal process for people to express their particular needs, when interviewed at home. Their local community town hall could provide for these needs and still have the advantages of the economies of scale that used to justify centralization. Bureaucracy can devolve responsibility to a lower level. So I think in a sense we will see less participation, but we will see more responsive government.

GA:baw-3

D2D030

TELECONFERENCING

A decision has to be made quickly. Bill Jones in the Calgary office, Tom Smith in Ottawa and Barbara Brown at Toronto Head Office must meet for discussion. *Today.*

Impossible? No, not with teleconferencing.

Teleconference '83 – the first Canadian Conference of teleconferencing was held on June 20 – 21, 1983 in Toronto, and was sponsored by the Transportation Energy Management Program in co-operation with the Canadian Industrial Communications Assembly, Ministry of Health and Humber College.

Over 250 people attended the conference, representing a wide range of businesses, health and educational institutions, associations and governments from across the country and the USA. Their previous experience with teleconferencing varied considerably – some were veteran users, others never teleconferenced before.

Mr. Glenn Thompson, Deputy Minister of Energy, opened the conference stressing teleconferencing's potential to reduce travel and improve communications. Over the next two days over 50 speakers and panelists made presentations on particular aspects. A wide range of technologies were described but the focus of the conference was on the benefits and applications of teleconferencing. The importance of attention to human factors in design, training and promotion was emphasized by Ms. Wendy Cukier, Conference Chairman.

The various forms of teleconferencing – audio, computer, electronic graphics, freeze frame and full motion – were described and demonstrated. On both days of the conference speakers participated from remote locations using teleconferencing. Jim Baker of New Brunswick Telephone made his presentation from St. John using Telidon and audio technology.

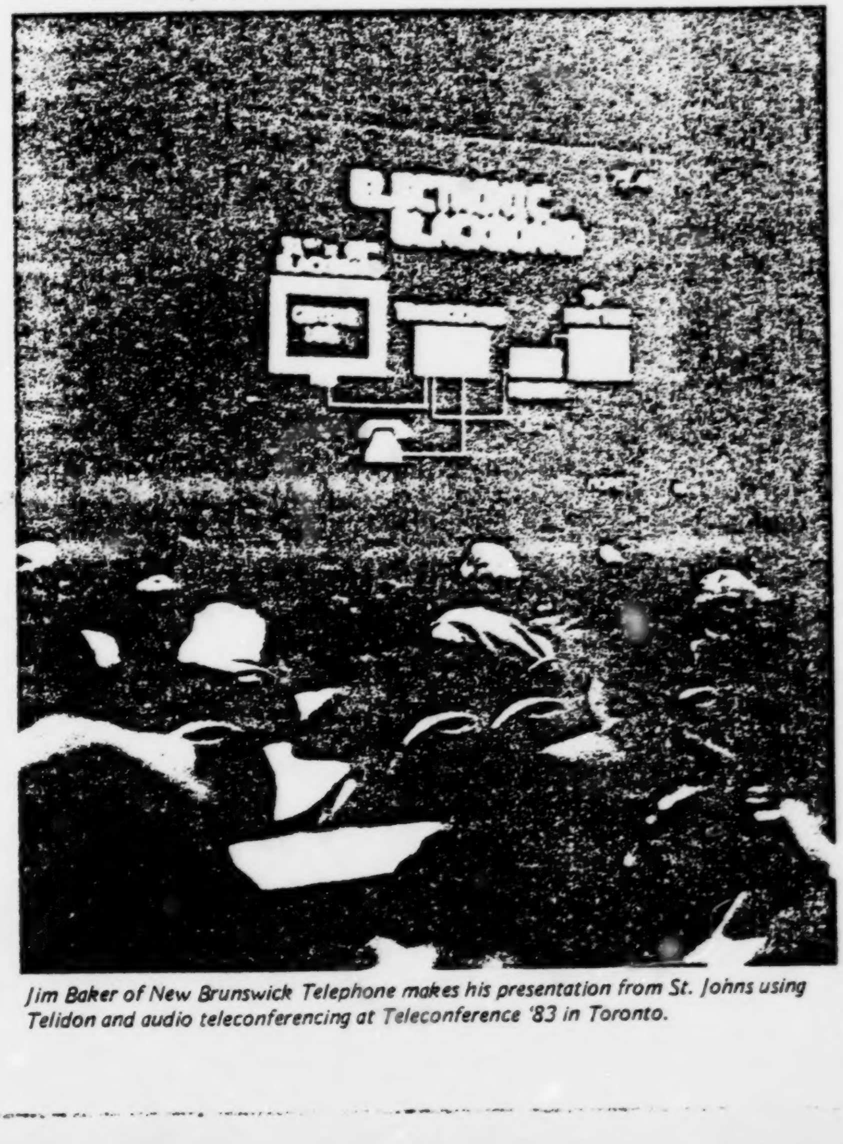
Jacques Kirouac from Bell Canada explained video teleconferencing from Ottawa using the very medium he was describing.

Users of teleconferencing described specific applications in health, education, business and government. Business in Canada is rapidly adopting teleconferencing as a means of increasing productivity and reducing costs. Mr. R.G. Aldcroft, Director of Sales and Marketing Administration, 3M, described how teleconferencing enabled his company to offer training programs and stay in touch with its sales office – the grass roots of the organization – despite severe budget constraints. Mr. Ed Pryzdial, Advisory Analyst for IBM Canada, reviewed the range of systems and applications of teleconferencing in his organization. One of the first Canadian companies to implement full motion video teleconferencing, Mr. Pryzdial confirmed its potential to reduce travel and improve efficiency.

Judy Roberts explained how a Joint Telecommunications Project was established by Toronto General Hospital and the Royal College of Physicians and Surgeons to provide continuing education to health care professionals. Dr. Earl Dunn of Sunnybrook Medical Centre explained how freeze frame video teleconferencing has been used to support patient care in remote areas of Northern Ontario.

From the University of Ottawa's perspective, teleconferencing offers ways of offering professional and academic courses to isolated communities. Dr. Donald McDonell emphasized the value of these facilities in enabling smaller communities to access resources in larger centres.

Although there is still, and always will be, a need for face-to-face meetings, teleconferencing offers a unique set of options which save time and money for everyone.



Jim Baker of New Brunswick Telephone makes his presentation from St. Johns using Telidon and audio teleconferencing at Teleconference '83 in Toronto.

ENERGY

by Gary Armen, B. Arch, MCIP, PhD

Senior Energy Planner
Community Improvement Division,
Planning Branch,
Community Develpment Department,
City of Ottawa.

GARY ARMEN has been trained in architecture, urban planning, management and social geography. He has been the Chief Planner in Stevenage New Town in England and as an Associate Professor at the School of Urban and Regional Planning at the University of Ottawa, he introduced the first course in Energy Planning. He is a member of the 'Friends of the Future' Society and he joined the City of Ottawa in 1981.

ENERGY

by Gary Armen, B. Arch, MCIP, PhD

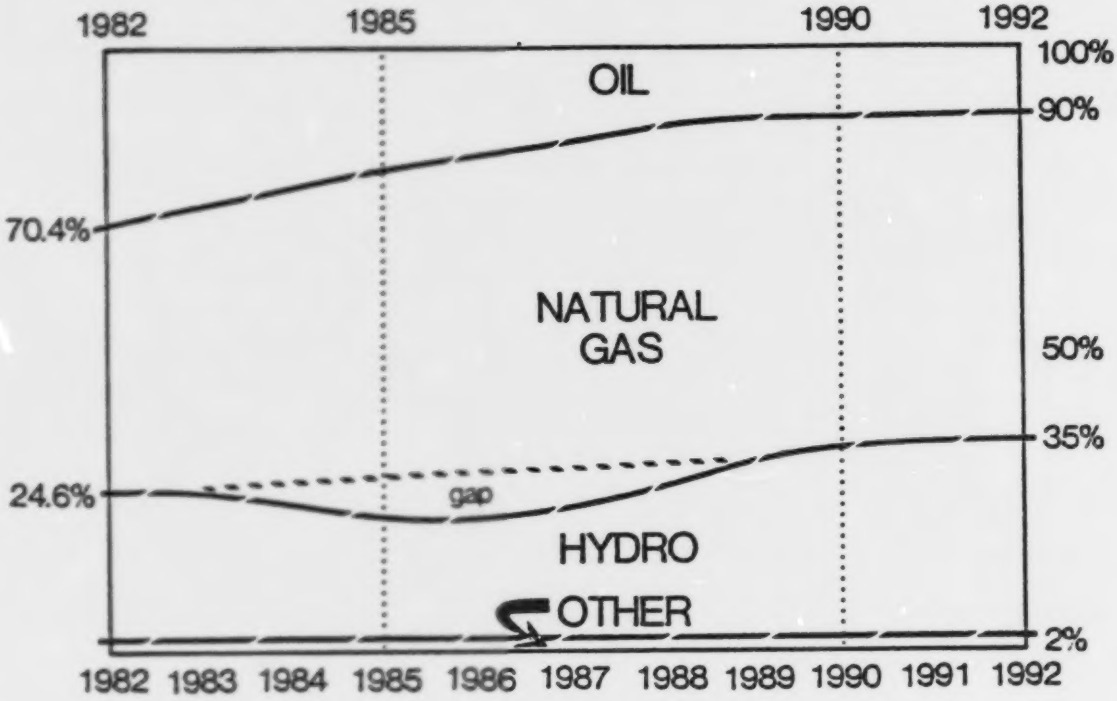
Originally, I intended to invite three experts, one on oil, one on natural gas and finally one on electricity to give us the latest situation and official price projections to 1992, for these three forms of energy. Subsequently, I thought that three experts on energy would certainly take too long and invariably give rise to controversy. I therefore propose to give you an overview of a very interesting workshop I attended last week at the NEW NEIGHBOURHOOD convention in Toronto. I have supplemented the information with all the latest information I could find at this point in time. Uncertainty on energy is a fact we shall have to live with, I think, for at least this decade.

OIL

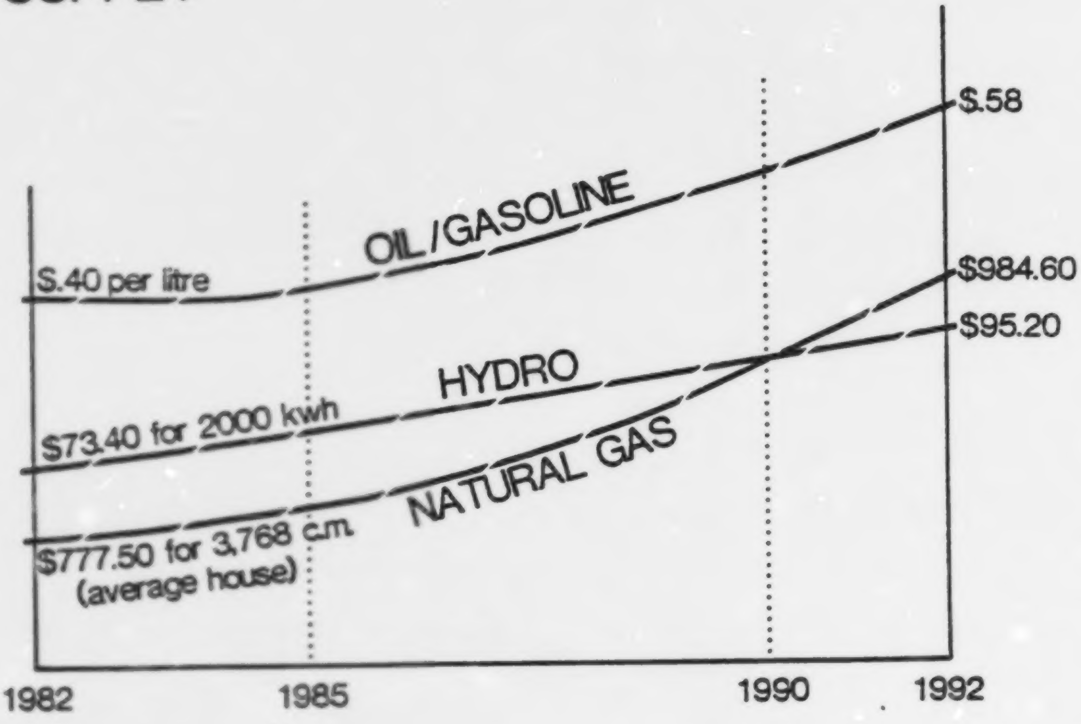
Oil will continue to pose the threat of uncertainty not only for the present and for the Province, but for the future and for the national picture as a whole. Currently, Saudi oil costs $39.00 per barrel and there are cheaper oils around, like the Venezuelan, which varies from $36.00 to $37.00 per barrel. Now we have to balance the availability of cheap imported oil in this particular time of a world glut - which is very temporary, I am assured by the experts - with the fact that our Canadian 'new' oil costs at least $38.00 to $40.00 to produce and yet it has to be marketed at $36.00 or $37.00. There is also the Canadian 'old' oil, produced from long established resources which is as low as $27.00 per barrel. The great dilemma for Canada is whether to use this local cheap oil and make the nation more dependent on imports in future, by depleting a resource or whether, in fact, to reserve Canadian old oil and keep importing to build our reserves. We have about 8 years' of reserves and if there is any sudden emergency in the world situation, we can always rely on them. In the meantime, as long as oil remains rather cheap on the market - and this glut is expected to have an impact until 1985 - it may well be that Canada will keep importing and stockpiling the oil reserves.

In light of this situation, it is projected that by 1992 Canada will still need to import some of the 1.70 to 1.76 million barrels per day (mbd) we shall need, by comparison with the 1.60 mbd we use today. Only about a third of the oil we used in 1980 went for heating and by 1992 the proportion could be less than a fifth. The increase in demand from 1.6 mbd to 1.7 mbd is expected to come mostly from transportation. It seems that despite all conversions to propane or to foreseeable alternatives like hydrogen and electricity, there will still be some cars using gasoline by 1992.

The price of gasoline in Ottawa is very difficult to predict for each of the study periods we have to bear in mind in this Symposium - i.e., 1983-85; 1986-88; and 1989-92. The only projections available were the ones issued by the Ontario Ministry of Energy in December 1982. The graph (No. 1) indicates a price of 40¢ per litre, increasing to only 42¢ by 1985, but climbing up to about 70¢ to 72¢ by 1988, and up to about $1.00 by 1992. Naturally, competition between suppliers could make these prices fluctuate by ± 5% from these averages, but the overall trend is fairly clear: stable prices to 1985, rising considerably by 1988 and rising at a comparatively slower rate to 1992. The assumptions accompanying these projections are many and liable to change: political stability, no major war in the Middle East, economic



SUPPLY



PRICE

GRAPH NO. 1

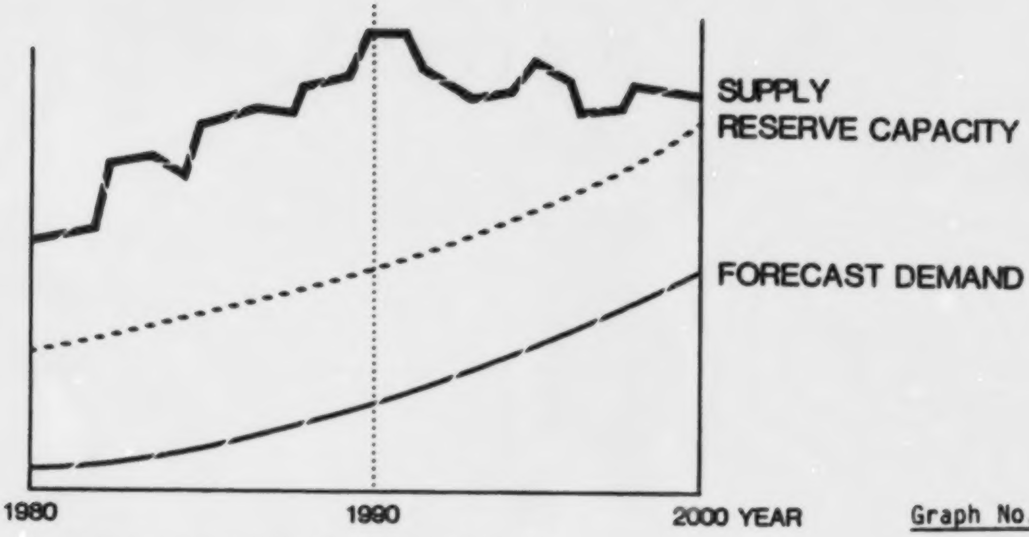
recovery in the West, cooperation between OPEC members, etc., etc. A change in these assumptions would justify a change in projections and therefore the only firm conclusion one can reach, looking at the oil situation for the study decade, is that uncertainty, rather than scarcity of supplies is going to be with us - for as long as we remain dependent on sources from abroad.

ELECTRICITY

Ottawa Hydro has applied to Ontario Hydro for new supplies and subsequently Ontario Hydro has applied to the Environmental Assessment Board for permission to build a transmission line. The decision will be reached by 1984-85 and we may expect "brown outs" or even "black outs" due to shortages up to 1986.

Ontario Hydro has a long-term programme for building new generating stations - unfortunately all nuclear - and as the graph (No. 2) shows, the supply will come "in lumps" to build up a reserve capacity well in excess of actual or forecast demand. Demand is expected to grow continuously in Ontario at the rate of 2% per annum. The construction of power stations will naturally entail debt and interest payments and this will affect the price paid by the consumer, even though supplies will be plentiful.

Electricity is expected to become cheaper than natural gas by 1990, if the current stipulation in the agreement with Alberta - that gas be marketed at 65% the price of oil - continues to remain in force. The growth in demand of natural gas due to conversion of cars from gasoline may tempt suppliers to increase the price above this stipulation.



Graph No. 2

HYDRO DEMAND & SUPPLY

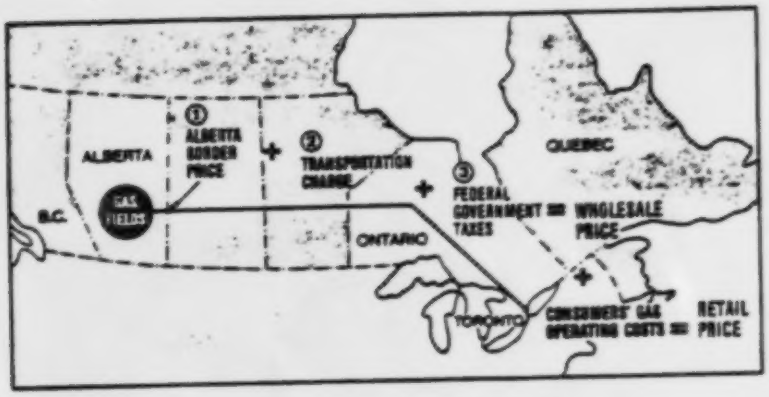
Assuming that the average domestic consumption of electricity over the study decade will be around 2000 kwh per annum, the 1983 price of electricity will be $73.40 for each bi-monthly billing period and it will increase steadily to $95.20 (at today's dollar values) by the year 1992.

Some of the assumptions underlying these projections also make for uncertainty, though to a much smaller scale than oil. Electricity will remain steady in price, if no revision to the nuclear power station programme is introduced as a result of recent incidents; if uranium continues to be available; if nuclear waste disposal does not arouse popular protest; if renewable energies do not become cheaper, etc., etc. The only safe conclusion is that electricity will continue to be a Democles' sword over our head, to the end of this century.

NATURAL GAS

Canada has more reserves of natural gas than it was predicted a few years ago. An estimated 17 trillion cubic feet are available in Arctic regions alone and

HOW GAS PRICES ARE ESTABLISHED


ALBERTA
B.C.
GAS FIELDS
① ALBERTA BORDER PRICE
+
② TRANSPORTATION CHARGE
+
③ FEDERAL GOVERNMENT TAXES
= WHOLESALE PRICE
QUEBEC
ONTARIO
TORONTO
+
CONSUMERS' GAS OPERATING COSTS
= RETAIL PRICE

The price you pay for the gas you use is a combination of the wholesale gas price (the price Consumers' Gas pays suppliers for natural gas from the west) plus what it costs us to distribute gas to your home or place of business.

1. The Wholesale Gas Price

This price is established by the Federal Government and reflects the agreements made by Ottawa with the producing provinces. Currently, this price is targeted to be 65% of the price of oil (35% *cheaper* than the price of oil).

Three elements make up the wholesale price:

1) The Alberta Border Price

This is the price of gas as it leaves the Province of Alberta. This price element is set out in the agreement between Ottawa and Alberta and it provides for regular increases every 6 months up to August, 1986, under the National Energy Program.

The Alberta Border Price covers royalties to the Provincial Government, provincial transportation costs and income for the gas producers of the province.

2) Transportation Charge:

This price element covers the cost to deliver gas from Alberta to Ontario via TransCanada PipeLines, whose rates are approved by the National Energy Board after extensive public hearings.

3) Federal Government Taxes

This price element covers federal excise taxes as provided for in the National Energy Program. Included in these taxes is the special Canadian Ownership Special Tax which is directed to the Federal Government's purchase of Petrofina.

II. Consumers' Gas Operating Costs

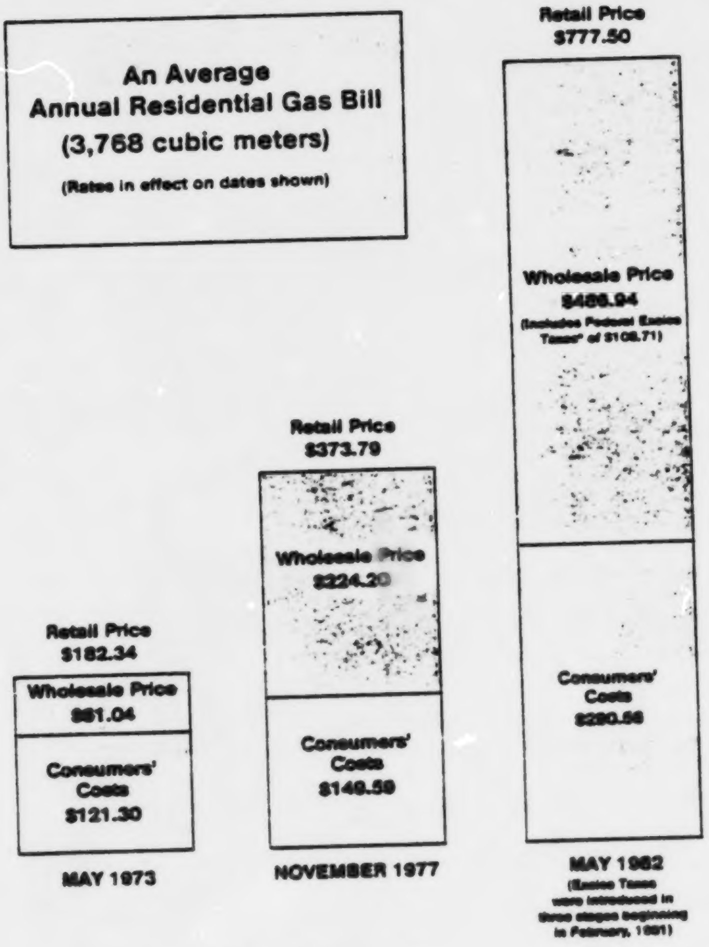
Consumers' Gas receives gas from its suppliers and distributes it to your homes and places of business, and those distribution costs make up the second price factor.

Included in these costs are the expenses of financing the pipes, meters and valves that make up the distribution system . . . the expenses involved in administration, operation and maintenance . . . depreciation costs . . . municipal property taxes and federal and provincial income taxes . . . and dividends to the shareholders who invest their money in the Company.

These Consumers' Gas costs, and the final gas rates are approved by the Ontario Energy Board after extensive public hearings.

When we combine these two price factors — *the wholesale price* (over which Consumers' Gas has no control) and the *Consumers' Gas costs* (over which we do exercise control) – *the retail price* is created and this is the price you pay for the gas you use.

On the following chart, you can see the impact the wholesale price has had on the retail price.



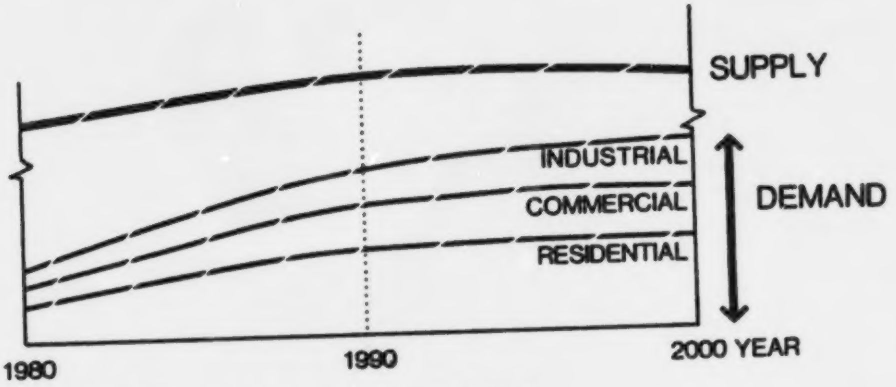
*The Federal Excise Taxes are made up of:

• Natural Gas and Gas Liquids Tax	$ 88.96
• Canadian Ownership Special Tax	$ 19.75
Total Federal Excise Tax	$108.71

Consumers Gas System

Consumers' Gas · Provincial Gas · Ottawa Gas
Grimsby Gas · Brockville Gas

it is therefore safe to predict that natural gas will be plentiful in Canada for decades to come. The only problem is how to make this wealth known, how to persuade Canadians to use it, how to generate demand in order to avoid more than 10,000 wells already closed down in Alberta from ceasing production.



NATURAL GAS FORECAST

Graph No. 3

Today, 53.7% of the gas produced is used for heating and no less than 60% of all conversions from oil have been to the use of gas. Liquified Natural Gas (LNG) currently available for transportation at 23.8¢ per litre could not really be more competitive in relation to oil. Lifecycle costs on a car indicate 33% saving if it is run on LNG and Ontario is offering $500 subsidy for the conversion of every single vehicle. Industrial and commercial uses are also expected to grow, as shown on Graph No. 3, but the supply available is many times the demand we can foresee for Canada to the end of this century. Natural gas is Canada's second most valuable export, and if pipelines were built and export rules relaxed, it could easily become the most valuable.

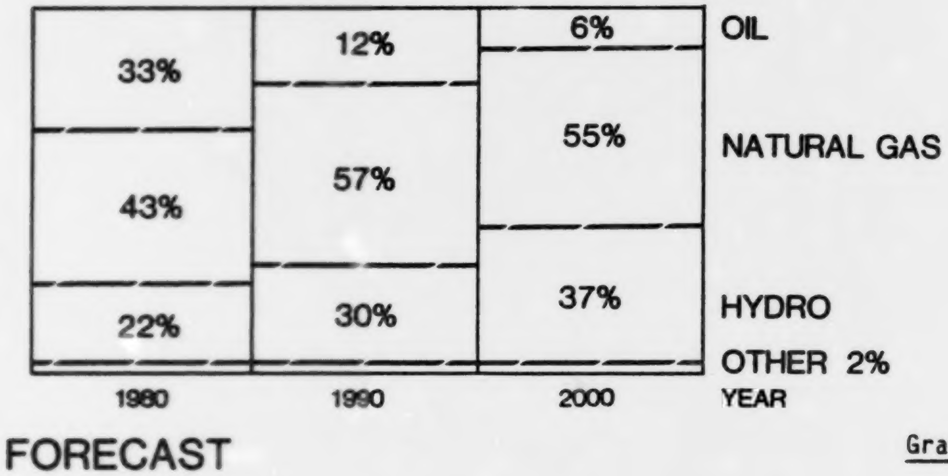
As regards price projections for the study period, at present the average home consumes about 3,768 cubic metres of natural gas per annum which costs $777.50. If we assume no growth in this average, by 1985 it will cost about $805.00; by 1988 about $890.00; and by 1992 about $984.60. Notice (Graph No. 1) that by 1990 the prices of electricity and natural gas have merged to the same value per calorie or joule of heat obtained, but thereafter natural gas may become more expensive. This must present a dilemma for the Federal Government in that, if they reduce the current 41% tax on natural gas to allow it to become cheaper, demand will grow and the need for nuclear power stations to generate electricity will decrease. On the other side of the equation, a valuable resource and a source of US exchange will start to be depleted and over the long-term that may not be a good policy. Thus, even a plentiful resource can be a problem in these uncertain years of energy supply.

HYDROGEN

Research under the direction of Prof. David Scott of the University of Toronto indicates that by 1988 we could expect some exciting developments in the use of hydrogen for transportation. The present use for rockets and nuclear weaponry is keeping the price beyond access to the consumer, but recent advances in inexpensive methods of water electrolysis may affect a revolution. Hydrogen conversion of cars would be quite feasible by 1988 and liquified hydrogen gas may prove to be the ultimate fuel for transportation.

Conclusion

Graph No. 4 shows the relative proportion of use of various types of fuel between 1980 and 2000. The allocation of only 2% to renewable energies - including hydrogen - by all official projections is a real puzzle. Let's hope that developments by 1990 and 2000 will pleasantly surprise the authorities as well as the consumers.



Graph No. 4

QUESTION: Has energy conservation had any effect in the Ottawa region?

ANSWER: No progressive consumption - i.e., year after year - surveys have been carried out in this region, but at national level former projections of 60% increase by 2000 have been modified to 22%. This is an eloquent way to indicate that conservation is really at work.

Attitude surveys carried out by the City of Ottawa, by Carleton University and the Federal Government indicate the following:

a. People in Ottawa were progressing from the modification of homes towards energy efficiency to the modification of lifestyles and a community approach to conservation (from 6% to 12% between 1981 and 1982 surveys).

b. About 41.5% of the households interviewed had made use of financial grant programmes related to energy.

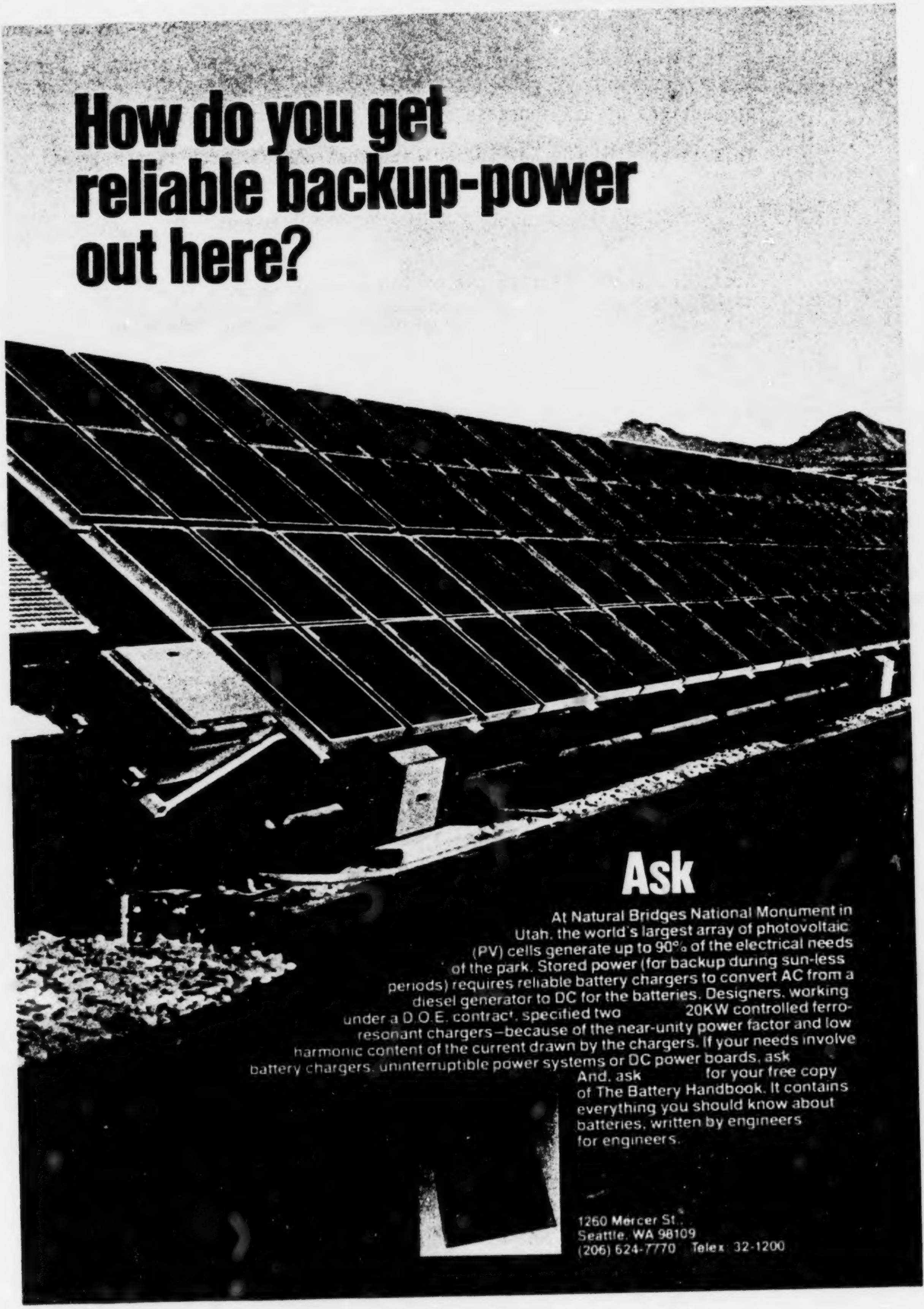
c. Ottawa, together with Halifax, was distinguished as a city where the problems caused by the scarcity of energy were perceived by the people as serious.

REFERENCES

- PUBLIC ATTITUDE ASSESSMENT STUDIES ON ENERGY CONSERVATION (1982) - City of Ottawa Library, 4th Floor, City Hall.

- THE CARLETON JOURNALISM PUBLIC OPINION SURRVEY ON ENERGY OPTIONS (1983) - City of Ottawa, The Project Manager, Energy Action Plan Process Office.

- ENERGY: CANADIANS' ATTITUDES AND REACTIONS (1975-1980) - Consumer and Corporate Affairs, Canada (Ottawa).



How do you get reliable backup-power out here?

Ask

At Natural Bridges National Monument in Utah, the world's largest array of photovoltaic (PV) cells generate up to 90% of the electrical needs of the park. Stored power (for backup during sun-less periods) requires reliable battery chargers to convert AC from a diesel generator to DC for the batteries. Designers, working under a D.O.E. contract, specified two 20KW controlled ferro-resonant chargers—because of the near-unity power factor and low harmonic content of the current drawn by the chargers. If your needs involve battery chargers, uninterruptible power systems or DC power boards, ask

And, ask for your free copy of The Battery Handbook. It contains everything you should know about batteries, written by engineers for engineers.

1260 Mercer St.
Seattle, WA 98109
(206) 624-7770 Telex 32-1200

AN UPDATE ON ALTERNATIVE FUELS

A growing concern over the need to reduce oil consumption has spurred technical research into possible alternatives. Propane, methanol, ethanol, and natural gas are all being studied for their effectiveness in reducing oil consumption.

Propane is the most popular alternative fuel. It's most important advantage is cost – approximately 15 per cent cheaper per kilometre driven than unleaded gasoline.

Today it is possible to convert your vehicle to propane through a relatively simple process. Filling up isn't a problem either – a distribution system has already been established for propane users.

Alcohols can be used as fuels in either a blend with gasoline or alone as a *neat* fuel. The two major alcohol fuels are methanol and ethanol.

Methanol is extracted from feedstocks like natural gas, coal, peat or biomass. Methanol can be used as a mixture with gasoline; only minor modifications need to be made to the gasoline engine. The use of straight methanol requires a more extensively modified engine.

Limited fleet testing of methanol is currently being carried out in Ontario for a period of one year. Indications are hopeful for the future use of methanol as a commercial transportation fuel.

Ethanol is derived from crops and wood and is used extensively in countries like Brazil. An ethanol blend – gasohol, which is 10 per cent ethanol and 90 per cent gasoline – is now used in the United States as well as Brazil. Canada does not have an excess agricultural supply necessary for production of ethanol.

Natural gas is another viable alternative for oil. There are large and increasing proven reserves of natural gas in Canada.

Even though natural gas is inexpensive, its compression is expensive and energy consuming. There are high conversion costs and a low driving range associated with its use.

Natural gas can be stored in either compressed form (CNG) which has about an 80 km range, or liquid form (LNG), but storage systems are still in the experimental stage.

Over the past one and a half years Consumers' Gas has run a test program involving 25 vehicles converted to run on natural gas. This has recently concluded and a report on vehicle performance and gasoline displaced by the use of methanol has been produced. This past year Union Gas Limited (Chatham) has begun a similar test program for a period of two years. Vehicles involved include cars, vans, and trucks. The 25 vehicles operative in this demonstration are expected to displace enough oil to supply the heating needs of 23 homes for one year.

From all the testing that has taken place, methanol and natural gas are at the most developed stage of all the alternatives currently being explored. These two alternative fuels appear to have the potential for wide-spread use as a transportation fuel.

In the midst of this movement to conserve oil, a number of seemingly bizarre alternatives have also been experimented with.

Imagine going to the grocery store for your next fill-up of SOYBEAN OIL!

It may sound unbelievable, but Volkswagon in Brazil is actually using soybean oil for fuel. Apparently their vehicles get mileage and performance comparable to standard diesel fuel. And, if the soybean oil supply is scarce, oil from peanuts, sunflowers, palm trees and rape seed plants can be used.

Jack Douglas, Sr. Motor Mechanic, shows Tony Stermac, Director and Rie Kidman, Transporation Energy Management Program Co-ordinator the special features on the new methanol Escorts.

IS CONSERVATION STILL IMPORTANT?

Saving Oil Still Important

Why conserve?

That's the question everyone's asking.

When there's talk of an oil glut – OPEC is in disarray, oil companies are closing refineries, and prices have plunged – why conserve?

The answer is the future. We cannot allow today's situation to lull us into a false sense of security that could prove devastating in the future.

What is being called an *oversupply* of crude oil is actually low demand, due to the recession and to successful conservation and substitution programs. Our present *glut* could disappear at any time with an economic upswing.

Lead times in the energy business are another good reason to conserve. Canada's declining reserves of conventional crude will have to be replaced by expensive oil from the frontiers or from oil sands if we are to be self sufficient. It takes five to ten years to bring such oil into production.

In the meantime, we must import the difference between consumption and production. OPEC controls 35 per cent of the world oil production and 65 per cent of world reserves, so its influence will increase into the future. Any trouble in the Middle East that affects the flow of oil could dramatically affect us in Canada.

The answer? Conservation. Achieving crude oil self sufficiency will require a reduction in consumption as well as an increase in supply. Both Canada and Ontario have set crude oil self sufficiency as a target for 1990.

Today many companies realize the potential effect this situation could have on their operation. General Foods is one company still concerned about rising oil costs and the impact these can have on their budget. Hayden Legge, Manager, Sales Operations, stated that he believes that fuel costs will continue to rise and that General Foods will continue to look for methods to conserve fuel –". . . we intend to continue with driver education, down-sizing vehicles and we're looking positively at increasing the number of propane vehicles in our fleet in Ontario."

Small businesses can save just as significant an amount. Fuel savings are in proportion to the number of vehicles in operation.

Why conserve?

To save money. Conservation means making productive and efficient use of our energy and our economic resources.

Guidelines Should Help To Facilitate The Siting Of Propane Fueling Facilities

As part of its commitment to the use of propane as a motor vehicle fuel, the Province of Ontario is developing improved information for municipalities and industries on the process for establishment of propane motor fueling facilities. To facilitate this, efforts are underway to establish guidelines to help co-ordinate the activities required to install the necessary equipment.

While Ontario is a leader in the number of propane stations already in operation in Canada, the province wishes to ensure that propane is available to those who use it. To do this requires input from a number of groups as follows:

Canadian Gas Association
Ministry of Consumer and Commercial Relations
Ministry of Transportation and Communications
Local Municipalities
Ministry of the Environment
Office of the Fire Marshal
Ministry of Energy
Propane Gas Association of Canada
Ontario Petroleum Association
Association of Municipalities of Ontario

One of the new propane filling stations in Metro Toronto.

Through discussions with the individual organizations, it is intended that a guide which addresses the siting requirements of propane fueling tanks and dispensers will be published this fall by the Ministry of Energy. Such guidelines will help establish the procedures required to site a propane refueling facility.

This will clarify the roles and responsibilities of the different agencies/parties involved, thereby assisting in the development of additional stations.

URBAN FORM AND STRUCTURE

by Nick Tunnacliffe MA, MCD, MRTPI, MCIP

Director,
Policy and Programme Division,
Planning Department,
Regional Municipality of Ottawa-Carleton.

NICK TUNNACLIFFE was educated in geography and civic design at Cambridge and Liverpool Universities in England. He has held positions with Durham County Council in England, the Federal Department of Municipal Affairs and the Ministry of State for Urban Affairs. He joined the Regional Muncipality of Ottawa-Carleton for the second time in 1978.

URBAN FORM AND STRUCTURE

by Nick Tunnacliffe MA, MCD, MRTPI, MCIP

I have been asked to talk about Urban Structure which is a nebulous thing. What I propose to do is look at just four things. The extent of the urban area, the difference in activities, the intensity of activities, and finally the infrastructure, which is going to tie everything together.

I want to make two important points at the outset. First of all, the urban structure must be a reflection of how we live; 'planning is for people' and 'cities are for people.' The things that people do are going to have a very direct influence on the urban structure.

The second important point is that by 1992 approximately 90% of the urban structure of the urban area is already in place and so, we cannot expect to see very many major changes.

Let's now take the first point: extent of the urban area. It is very definitely something we can conclusively say is that the urban area will be bigger, perhaps very much bigger. Our estimate with the population ranges that we have in Ottawa-Carleton is that we are looking at something like 2,300 to 5,800 additional hectares of land to be urbanized in the next decade. It is very substantial. Now even at the low end, it is more than ten percent of the land that is already urbanized. The scenario on which it is based is one of additional people in the decade, 18,000 jobs and 35,000 households. At the high end, we will be looking at 90,000 additional people, and 47,000 jobs and

53,000 households. But if we do think this area is going to grow economically. (I think there is a good possibility that it is, I know Dan is going to be talking about that later and perhaps we will get into that) then we could be seeing populations of certainly over 600,000 maybe towards 650,000 in a decade.

Secondly, let's look at the differences in activity. It has been a tradition in planning for many years, ever since zoning was invented, that land uses should be segregated and I believe that this is beginning to break down. There are not too many examples in Ottawa itself, but in other cities, we are beginning to get mixed use development. I think that over the next decade, we should probably see more change in this area than in any other. That might take two forms. it might be purpose built, mixed-use complexes, or it may take the form of relaxation of standards that we already have in place. Zoning standards in residential areas may well change to permit a much wider variety of certainly commercial uses, perhaps even light industrial uses. In industrial areas, maybe we shall see a blurring with more and more commercial uses going in there of a retail nature, office nature and perhaps things like hotels. So I think we shall get this movement towards mixed uses.

Thirdly, look at the amount of activity in one place. One of the trends of the last decade is that we have been building at higher densities, but we have been living at much lower densities. Let me explain what I mean by this. I think over the decade 1971 - 1981, the average density - i.e., residential density - was 22 units per residential hectare, and I think now it is up to 25 units. But the people actually living in the units decline significantly from 75 persons to 68 persons. Why is this going on? I think we have to ask ourselves. I would say there are two reasons. One, we can afford it, i.e., people are earning more money, and two they want to live that way, e.g., they are choosing to delay having children, they are choosing not to have children at all, they are choosing to separate and so on. We have to ask ourselves, is this likely to go on, and I think everything that I see points to continuation of smaller household sizes that Barry identified. This means we are going to require more and more housing units to support the population and this is going to mean, if present grant trends continue, that we are going to need more and more urban land. One of the challenges of the next decade is going to be what proportion of the people who are now demanding single family and low density units can be persuaded to choose denser development either located in the suburbs or in infilling projects in the already built-up area.

Finally, turning to infrastructure, from the water and sewer point of view, I think we can assume that water and sewer services are going to be provided in our urban area. With a possible question, specifically about the south urban community, I think Regional Council is going to have to ask itself whether it can afford to spend perhaps as much as $60 million to extend those pipes. It is an enormous amount of money and that is going to be a very crucial political decision. With that aside, I think we can assume that in the urban area for foreseeable future, water and sewer services will be provided. In roads, I think we are going to see a continuation of major improvements primarily in suburban areas. The Hunt Club bridge and approach roads, perhaps the western boundary road, the Queensway going east and maybe even a 416 are examples.

The big change for Ottawa-Carleton is going to be the introduction of the Transitway which Brendan is going to talk about. I am not going to talk about that specifically. What I do want to raise, and conclude on, is the potential that this transitway is going to have to create an opportunity for what I call nodal denser mixed use development. I think the trends in several areas are pointing in that direction, I think the transitway can be the catalyst for that, and being very spcific I can identify the following potential sites we got the Eastgate Site, St. Laurent Shopping Centre and the surrounding lands, we have the land owned by the Federal Government between the Rideau River and the Ottawa Station and we have the land that was owned by the Federal Government, has just recently been sold, at the corner of Baseline and Woodroffe, we have Billings Bridge and we have South Keys. These certainly are all very much candidates for this sort of development. I think we shall see development at some, but perhaps not all of these sites by 1992.

GA:jac-4

D2D122

COMMERCIAL DEVELOPMENT

by Ray Levesque, MA (Econ), MBA.

Vice President,
Commercial Development,
Minto Corporation Limited.

RAY LEVESQUE has been educated in economics and business administration. He has been teaching at the University of Ottawa and has held positions with the Commercial and Industrial Development Corporation and Campeau Corporation. He joined Minto in 1983.

COMMERCIAL DEVELOPMENT

by Ray Levesque, MA (Econ), MBA.

Before attempting to forecast my area, of involved commercial development in terms of volume, construction, volume of delivery of space over the next ten years, and comments on the spacial distribution of space, I would like to make four broad assumptions.

The first one relates of course to the dominate role that the Federal government plays in the economy of this Region. From a practical point of view, commercial development in Ottawa is not a free market. It should be obvious to everyone who operates in this region that whatever the Federal government decides to do or not to do, has a major impact on what gets built. Certainly the Corporation that I represent has learned that very well over the years, having been the prime developer of the space that is now occupied by the Federal government. So my first assumption is that over the next ten years, there will be no significant deviation from the paths of government growth, as we have seen over the past twenty-thirty years. There may be some temporary disruptions brought about by various forces, be they political or economic. But a steady upward trend in the employment of the public service is the only safe assumption for this region.

Secondly, that there will be, under this assumption, no major policy decision such as was propagated five or six years ago, when the Federal government decided to shift a fairly substantial portion of its people over to Hull (in a sense in the Ottawa-Hull Region, but outside the Ottawa-Carleton Region) or to shift altogether outside this region i.e., Veteran's Affairs to Charlottetown. So I am assuming that there will be no major policy shifts that would take the public servants outside of Ottawa - not more than 5% or 10% at most.

If the government sector is the prime user of office space and the prime mover behind what happens in the market for office space in Ottawa, I am assuming that there will be no major reason creating a significant influx of private sector enterprises and/or non-profit organizations into our region. Heaven forbid if the political situtation in Quebec, for example, were to turn very bad and 150 firms decided to leave Montreal. We would get half of them here, of course and this would have a tremendous effect on the market. But I am assuming no 'Doomsday Scenario'. Nor am I assuming any very significant role in the relocation of national organizations to Ottawa. Some of you may be aware of that the Red Cross has decided to establish its headquarters here in Ottawa and I am assuming that we will be getting our fair share of relocations over the next ten years, but nothing major that would cause all the non-profit organizations dealing with the federal government to be in Ottawa. Similarly, I foresee no significant growth in non-profit organizations that are already here and dealing with the Federal government. Either providing information, or lobbying, or whatever. The phenomenon that occurred in the past ten or fifteen years, when National Associations and major corporations established Ottawa offices, Ottawa bureaux, etc., I think has gone its course. We now have a significant employment created by those organizations and I don't see any significant increase in the employment within those organizations. It is going to be natural growth from now on. I certainly don't foresee any kind of drastic and dramatic increase in employment and investment caused by the growth of the high-tech industry and I would like to focus on this for a moment.

When I moved back to Ottawa from Montreal about a year ago I guess last Friday, after an absence of about six years from the City, I joined CIDC. As you all know, CIDC's prime role is to promote the economic development of the Region. At that time, there had been some forecasts made of the possible growth of employment in the high-tech industries in the Region - about 100,000 jobs by 1990 - I don't know if you remember that figure, but I was amazed, having known the Region extremely well, having grown up and worked here for a longtime. I think there is a need for some sobering thoughts in forecasting what the high-tech industry will do, specifically to this Region, in terms of investment and employment growth.

Thirdly, I am assuming that the emerging technology relating to the work that we do in offices will not be strong enough to significantly change over the next ten years. If we were talking about twenty, thirty, forty years, I might have a different view. I cannot see any significant change in how we structure our work in organizations and where we accomplish that work. I remember sitting around a similar table in 1970 as a member of the long-range planning group with the Department of Communications and forecasting how society would work - in terms of type of work, the tools we would use by 1980, the emergence of the wired city, etc. In looking over those notes over the weekend, I can assure you that some of the forecasts we made then, we haven't even come close yet. I still work in an office, I still go downtown, I don't work with a terminal, but I do utilize a terminal, and the terminal does not replace my colleagues and so on and so forth. So, I am very pessimistic - compared to the technologists who may be very optimistic - that high technology is going to change "everything" over the next ten years. It certainly hasn't in the past 13 years.

Lastly, I am assuming that over the next ten years, there will be no major changes in our shopping patterns and tastes. We will still be going to regional shopping centres, we may be going to the new shopping centre opening up in downtown Ottawa, but we will not be replacing our shopping and buying habits that we have nurtured over the years. We won't exchange those for computer or terminal shopping, or whatever you want to call it. We will still be displacing ourselves - the same frequency, the same pattern - over the next ten years, just as we have been doing over the past, ever since shopping centres became an emerging force in most of the regions of Canada.

So with those four assumptions, what I foresee for our area of involvement as a developer, is a continuation of the trend, in terms of the volume of office space and office accommodation that is created in the Region over the next ten years, in the order of 500,000 - 600,000 square feet per year.

1981 was a very unique year, in that we went over that figure. Well, there were some very good reasons for that. The Federal government decision to relocate a lot of its people to the Hull side, meant that there was a lot of empty space, nothing got built, and so on and so forth. You are now looking at a vacancy rate of less than 1% or close to 1% for prime office space in Ottawa. So therefore, there will be - there was a boom in terms of the absorption in 1981 - but I think we will be returning to historical levels and nothing will cause us to deviate significantly. We won't be having a year, I think, over the next ten years, where we are building and absorbing a million square feet in the City - it just won't get done.

It is a similar pattern to what Montreal has experienced. Having been involved in real estate in Montreal in 1981, I can tell you, it was a rather unique year. It is very easy to explain why. Nothing was built there since 1976, so the building that were built in 1980, took up the natural growth. We, as owners, (I was with another corporation in those days) were just raking in the dollars as the demand was there. Ropers were going rich, and so on. They all went broke in 1982. Some of the space that was on the market at the end of 1981 in Montreal, is still on the market - you cannot give it away. So, Montreal, that had an historical absorption rate around 800,000 square feet per year, went to 1,600,000 to 2,000,000 in 1981, and now is going to come back down to 800,000 or 600,000 or whatever.

In terms of the delivery and creation of new office accomodation, I would foresee a very slow growth of 2-3% per year in the range with 500,000 to 600,000 square feet per year, over the next ten years. However, I do see the possibility of something happening which we really had not been foreseen a few years back. Again, if I might use the analogy of Montreal, and going back to the comments on Urban Form and Structure, Montreal - for those who are not familiar with the city - is of course a very large city, and yet it is very different from a city like Toronto, in that it does not have a number of cores. It has just one. I'm talking in terms of economic activity and office space. If you were to draw a radius around Place Ville Marie, within a radius of a few miles, you would cover almost the totality of the office space that the region has. Whereas if you do that in Toronto, around Front street or around T.D. Centre, you would find that you would have to go out much further. You go to Mississauga and you see a lot of office space, which you know that has been created for various reasons. Montreal has never had that.

Well, I see that decentralized pattern emerging in Ottawa, to a certain extent, which may mean that some of that growth of 500,000 to 600,000 square feet will not happen only in the core, but may happen for example, along the Queensview Drive area, going out towards Bells Corners. Obviously Kanata may be considered a node with a certain potential to become a fairly large concentration of office space. I wouldn't have foreseen that ten years ago. Some of these prospects were created by the Federal government, forcing growth outside the core to Confederation Heights a few years back and so on. Some of this growth also comes from the private sector. Government is becoming more and more interested I think, in becoming a tenant in some of these suburban locations. So I see that trend developing - whether it is only a short-term, or whether it is a well-engrained trend that will continue and develop, I don't know yet.

In summary, not too much growth beyond the historical rate of growth we have had in the past ten years, but certainly a possible and potential shift in terms of the spacial distribution of the office space, as well as the shopping facilities that we are creating, because if we create an office complex, around the Pinecrest shopping area, it will by itself attract other developments and it will attract certainly some retail facilities, and the same for anyone else doing the same thing in and around the Region. So that is my forecast.

ECONOMICS

by Dan Stankovic BA, MA

Senior Policy Planner,
Policy and Planning,
Planning Branch,
Community Development Department,
City of Ottawa.

DAN STANKOVIC was educated in geography and specialized in urban economics. He has held planning positions with the Province of Ontario, the Regions of Peel and Halton and he joined the City of Ottawa in 1978.

ECONOMICS

by Dan Stankovic BA, MA

The subject of economic development has already been referred to by the other speakers. It is a difficult subject to get a handle on, in terms of forecasts, by reason of the dramatic changes that have occurred over the last ten years and the uncertainty that exists for the future.

I tend to disagree with Mr. Levesque in that "the Federal government will not deviate substantially from historical trends", although what "substantial" means is entirely subjective. For example, in the early 1970's, the growth rate in Federal government employment was astronomical, around 12% a year. I doubt very much if we will reach that rate again. I think what we might see in the Federal government is a more steady growth. What has happened in the last 25 years is that the Capital Region experienced periods of 12% growth rates per annum for five years, followed by a period of three or four years of 0 to 2% growth rates. This very cyclical movement in Federal employment growth rates, in turn has ripple effects in the rest of the economy.

I don't think we will see such wide fluctuations in Federal employment growth in the next ten years, largely because of the restraints in the economy and government spending. Instead, we might see a more steady growth over the next ten years which is quite good for the Region, because we will be able to plan better. For example, we won't have sudden spurts in housing construction, which increases prices and so on. The government will still remain a dominant employer of the Region, of course - given its enormous size, right now in the local job market.

The other factor which has singificant impact on the local economy is the "High Technology". The problem with this sector is that it is a very new growth sector in the Ottawa area, although the research facilities, especially in the Federal government have been in place for 20-30 years. The really substantial growth in this sector has only occurred in the last 4 years at most. More important, the sector is still a small industry in the economy. So, it is almost impossible to begin to predict the growth in this sector, and I agree with Mr. Levesque, that 100,000 jobs by 1990, is optimistic, very optimistic. I think the "100,000 by 1990" prediction is also something we wouldn't want to see happen in this Region. "100,000 by 1990", is as an equivalent rate of growth to what is happening out in San Francisco, in the Silicon Valley and we know what is happening out there in terms of congestion, pollution, high housing costs and long commuting trips. Such a high growth rate would result in significant disruptions to the whole Region, in terms of land development, infrastructue, planning and everything else.

But, I think there is certainly a future of advanced technology in the Region. It is a reflection of what has happened in the overall economy, the so called post-industrial era, where the industrialized countries are shifting their economic base from a goods-producing economy to a more service-producing economy, which is highly dependent on research, knowledge and information and the Ottawa Region has a head start in Canada in this sector. I don't see its momentum really depreciating and if anything, it is going to gain strength in the future. The recent expansion of Bell-Northern, the announcement of the Micro-Electronics Development Centre by the Province of Ontario - all these things indicate that the growth of high technology in the Ottawa area is here to stay.

The other interesting thing about advanced technology in the Ottawa area is that unlike the manufacturing base of Hamilton, Windsor and Kitchener, where most of growth has been through foreign investment and largely through United States companies, the growth in high technology here has been largely Canadian and Ottawa-based. That is, most of the firms that are expanding in the Ottawa area are firms that were formed and created through local entrepreneurs. The immigration factor has not been that significant, although that may increase in the future too, as Ottawa becomes more and more well-known, and more attractive to outside investment.

The overall economic growth found in the Ottawa area have implications again on the urban form and the location of activities. The emphasis on service-producing sector in high technology are more office-oriented as opposed to manufacturing-oriented, so that has implications on downtown growth. I also see a kind of a sub-clustering of employment centres in various nodes throughout the Region, although I think the downtown area can still retain its dominance in the overall regional structure. There has been also a relatively recent trend in the urban structure of the Region, as well as other Metropolitan areas, where we are no longer seeing a massive suburbanization process occurring anymore with large new residential subdivisions, new regional shopping centres, etc.

On the other hand, we are seeing more of a revitilization in the central city (City of Ottawa) in a general sense and in the downtown area in particular. Inner-City neighbourhoods have experienced substantial "white painting" effect. Areas that were loosing people migrating to the suburbs, have experienced a kind of a residential revitalization with people renovating older homes. The same is also happening in commercial areas where of course, the

Rideau Centre is an example of that kind of a development in a downtown area. So we are seeing this return to the central city in terms of reinvestment, revitalization or redevelopment. That is not to say that suburban areas are not going to continue to grow, or that they are going to experience decline in the future - I just don't think the growth in the suburbs is going to be at the expense of the central City anymore. There will be more of an equal sharing of the growth.

QUESTION: You seem particularly down on prospects for suburbanization. And yet the work that the Regional Municipality has done proves that over the last 5 years, 85% of new housing units are being built on virgin land in the suburbs. I am not sure and not convinced at all that infilling or redevelopment is actually going to produce that many more additional dwelling units. You also mentioned the renovation of our Inner-City areas, which has been going on largely as a result I guess of government money going into certain programmes like RRAP, etc. What I think it means is that poorer people are being forced out into the suburbs to get cheaper housing.

ANSWER

I am not so down on suburbs. I just don't see the shift that has occured in the 60's or 70' where growth in the suburbs was accompanied by a relative decline in the central city. I think the population of the City of Ottawa was on a downward trend for a number of years during the 1970's. In the last two years, however, there has been a slight increase or at least a stabilization in the City's population levels.

The location of jobs and the distribution of economic growth to such areas as Kanata - which is known to be centre of high-tech growth - hasn't had a parallel development in housing construction. Instead housing construction seems to be in the eastern end, towards Orleans. We've often asked ourselves, why, and I think that it is probably due to corporate policy of main landowners out there, than anything else.

It is worth noting that some of the employees from high-tech firms are more typical of residents in the Inner-City area who are better educated, better paid, the younger childless couple and so on. They are the ones that seem to be more of a central city dweller, than a suburban dweller.

You also have a lot of high-skill like or blue-collar jobs in the high-tech sector. Once again, a large proportion of this segment of the labour force are Inner-City dwellers. So once again, you get a dislocation of where jobs are and where people are, not only at the upper end, but also at the lower end of the skill spectrum.

QUESTION: I have not seen as much "white painting" as I would have expected, just five years ago. Things seem to be moving very quickly in some areas and Centretown has its examples sitting there, but the rate seems to have slowed down.

ANSWER

I feel that "white painting" tends to concentrate in areas and 'jumps around' to other neighbourhoods. New Edinburgh for example, is receiving most of the renovation and recons to be the "in-place" to live now, whereas before it was Glebe, Centretown, Sandy Hill and so on.

High growth in high-tech has been under the restraint of recession too. If the recession ever ends and we start entering a recovery period, the growth we experienced in the last two or three years could well increase substantially. So that is another problem, in terms of estimating growth in the next ten years.

I think that is a very important point, and that is why it makes me feel very uncertain about growth in Ottawa generally. The other aspect of that is that Ottawa-Carleton has seen an actual decline in Federal government jobs. I am assuming that, as that stabilizes, we start to grow again, and once more that is an uncertain factor.

QUESTION: To what extent does the high-tech industry become affected by recessions?

ANSWER

Once a recession comes in, high technology products are the last things they postpone. If the recession is prolonged, they will eventually postpone their telephone or computer purchase. However, these items will also be among the first purchases they make in a recovery.

Other cities like Windsor and Hamilton, which have the large corporations and established industries like steel or car, recovery may never occur again. 'Recovery' here, refers to an increase in new job opportunities. These industries will be replacing their increase in production, by new machinery or new technology. Even though the steel industry may pick up in the next ten years, you won't see much growth in terms of employment. Whereas in our case, increase in productivity will be matched with increase in job opportunities too. The 100% growth rate often quoted as being typical of local high technology firms is based upon a population of small firms of ten people. As the high technology sector increases in absolute size, the rate of growth is going to decline, simply because of the small numbers involved, but a 50% growth rate may still mean a larger absolute increase in jobs, compared to a 100% growth rate for a smaller employment base. There is also another factor, a very interesting one. Mitel is not that large a corporation, $250 million sales, on a world wide basis, is comparatively very small. But you start competing in the big leagues and you may have one product that is simply outstanding and you are taking all the market. As other industries enter the market however, competition for Mitel becomes very intense and you are not going to grow at 100% per year - it is impossible.

On the other hand, the San Francisco Silicon Valley also started off as being an agricultural orchard too. The history of high-tech in Ottawa, over a short five year period is not very different from what the original Silicon Valley experienced, in terms of size and diversity, but of course, it was phased about 20 years ahead in time.

TRANSPORTATION

by Louis Shallal, B.Sc, M.Sc, PhD.

Chief Systems Planning Engineer,
Transportation Department,
Regional Municipality of Ottawa-Carleton.

LOUIS SHALLAL was trained in civil engineering and specialized in transportation planning. Over the past 12 years he has held posts with the Ontario Ministry of Transport and Communications and the Regional Municipality of Ottawa-Carleton.

TRANSPORTATION

by Louis Shallal, B.Sc, MSc, PhD.

The first comment I would make is a repetition of the comment by Ray Levesque, who indicated a few minutes ago that, ten years into the future is really a short projection in terms of systems planning and now I see it even in terms of commercial space planning as well. I also share the opinion, that within the next ten years, there will not be any really major changes in the transportation supply and demand in the area. The single most important supply factor is the Rapid Transit programme, a transit system that will be built in Ottawa-Carleton, and Brendon Reid will talk to you about it.

I would like to make a comment though, and incidentally, I might sound like a heretic to my colleagues, that the automobile will not only continue to play a very major role in this urban area, but it will probably have an even more dominant role to play in urban municipalities in Canada. I think there will be a return to the automobile, an increase in automobile utilization in the future as a result of increase in leisure time. People will tend to use more and more their automobiles for leisure and recreation travel.

Car-ownership, a question that has been asked here, I think is on the increase. It will continue to increase, given the nature of the aging population. It will continue to increase even more, until we reach some sort of a maturity stage - "saturation level" is referred to, in a General Motors study. Some people here talked about how telecommunication will be used as a substitution for travel. I argue with that concept totally, I think telecommunication will be complimentary, but not a substitute. In much the same way that the telephone about 60-70 years ago was first to be the substitution for travel - actually it turned out to be an inducement to travel. It caused people to get in touch with each other to arrange things. When you can contact people from a distance you can make arrangements that would not have been possible otherwise. I see that the role of telecommunication devices will be to increase the demand for travel even more, rather than acting as substitutes for it.

In terms of trip purposes, I don't see any major changes in the actual distribution of travel by purpose. I think there will be more and more recreational, shopping and personal business type of travel, in proportion to the total trips. In terms of shopping trips, I really don't think that they will be substituted for by the type of communication devices discussed earlier - whether by TELIDON or ortherwise. I think, again, that these devices will increase travel demand, because of the fact that people would have the opportunity to review the options available to them, before they actually go and make the purchases.

Trip length, historically, has not really changed much over the years. In terms of actual travel time, it has not changed much either - it has always been a function of the size of the metropolitan area. The larger the metropolitan area, the longer the trip length. In terms of the actual time spent in travel, it is interesting that from the time the people were in their farm, or when they were living in a municipality and urban settings of only a mile or two in radius, they used modes of travel that were so slow, that the actual length of the trip itself, did not really change very significantly in relation to today.

If I may now take a minute and talk to you about the urban transportation planning process, I should like to start with individual components of it. To begin with, trip generation, which says how much travel will be produced in this area and how many will be attracted to different settings, will follow very closely the increase in the number of dwelling units. So, whatever Nick Tunnacliffe told us about projections in number of dwelling units, it may be assumed that trip generation will have a parallel and straightforward relationship to the number of dwelling units in the area.

There will be an increase in overall trips, in absolute terms relative to today. In terms of the distribution of these trips, it will obviously follow the actual patterns of spatial distribution of population and employment. I tend to subscribe to the theory that we will have activity centres. They will be large in size, primarily for two reasons: Firstly, because of the pressure of developers and secondly, because of the policies of the local governments themselves. Now, there will be a tendency to increase trip length in the future, because these centres will be created and because the overall size of the urban area will increase.

In terms of modal split, there was a question here about whether or not a shift to more efficient energy modes will be taking place. I would make one point. By all means, I will accept that public transit is a more energy-efficient mode, during the peak hour. However, speaking in terms of the time taken for the door-to-door journey, it is not more energy-efficient during the off peak hours. In fact, in terms of existing off- peak ridership, we know that it is not.

Is it wasteful?

I would simply say that it is not more energy-efficient than the auto, during off-peak hours. I would predict an increase in proportion of trips that are shifted to transit between now and 1991. However, there will be little breakthrough, in terms of attracting off-peak riders to the public transit system - primarily because of the fact that the general nature of these trips will be non-work-related and non-CBD-destined travel. For this reason, we will probably gain little ground there, while we gain more ground in attracting work travel. Even though policies of OC Transpo right now tend to attack off-peak-hour travel, I think they will not be very successful, because of the very nature of the work-trip during such periods.

In all sincerity, I must add however - and not because I work with the Regional Government - that we have perhaps a much better chance of having a balanced transportation network, now and by 1991, than any other city in Canada. This is due to the fact that we give as much emphasis to the public transit system, as we do to the road system. There will be no major infrastructure investments in terms of capital investment in trasportation - with the exception of few links in the transportation network, such as the Hunt Club Road, perhaps Highway 16 and a few others. There will be significant investment in the Rapid Transit system as Brendon will tell you, and that can keep our transportation system on a balanced term, which is good, I think, in terms of providing opportunity and choice to the people to decide what they want and how they want to travel.

There are of course ways to affect travel demand. But I think we have been fortunate in Ottawa-Carleton that our transportation system is operating in a sufficiently good level of service - level C to D, which, relative to other Canadian and American cities, we can afford for the period from now to 1991. I reiterate that except in certain critical locations, we can afford the luxury of not worrying about bumper-to-bumper traffic happening everywhere in the region, as on most arterials in North York, north of Toronto - to cite an example. I think we would not see that type of problem in Ottawa-Carleton for a long time. I think we will see more and more emphasis in the next ten years on 'transportation system management' type of actions (TSM), rather than on major road capital investments. Therefore, we will see some exercises involving share-a-ride and park-and-ride, associated with the Rapid Transit programme. Also, some high occupancy vehicle lanes - we already have them in Ottawa: bus lanes, reserved streets for bus travel and so forth. This type of solution will be pursued, so that we invest less money on major capital-intensive projects.

QUESTION: I find some of what has been said quite hard to believe. You are basically saying that despite the energy situation and car pooling that is going on, despite the cost of the vehicle as well as the gasoline, you still expect on a per capita basis the car trip to increase in the future?

ANSWER

Car-pooling to start with, is not a very large phenomenon in Ottawa-Carleton. Car occupancy during the peak hours is between 1.3 to 1.4 percent, because work travel is the dominant type of travel during the peak hour. It is expected that car occupancy will remain at that low level. In the non-peak hour, for non-work, for shopping trips and social-recreation trips, the average is between 1.7 to 1.8 persons per car. That is understandable.

To quickly answer your question, yes. I don't think that car occupancy has increased significantly to effect the role that the automobile would play. The number of trips per person has increased from (earliest data I have are from OHATS 1963, and the latest is based on a survey I did last year, 1982) about 1.98 in 1963, to just under 2.5 trips in 1982.

QUESTION Per person per day?

ANSWER

Yes.

COMMENT by a participant:

In spite of the fact that dwelling units occupancy has decreased, the number of trips per dwelling unit has remained the same if not even slightly increased. Automobile travel has actually accounted for over 90% of all non-peak period travel.

Energy
Ontario

fuel$aver

For Fleet Managers and Driving Instructors

Volume 1
Issue 1

Fall 1983

WELCOME TO THE ALL NEW FUELSAVER!

DriveSave, Trucksave and Drive Propane newsletters have now joined forces to bring you a wide variety of useful information that can help save your fuel dollars.

FuelSaver will inform you about recent developments in alternative fuels, differing experiences fleets have had with fuel saving programs, fuel saving driving techniques, good maintenance techniques for fuel economy, and more.

With energy and maintenance costs ever-increasing, turn to FuelSaver for ideas on how to achieve the best possible savings on your fuel costs.

BONDY CARTAGE -Successful Fuel $avings

Nobody doubts that the driver of a truck is the key to its fuel efficiency, but there are those who think that re-training a person with 10 or 15 years of experience at the wheel is a lost cause. Well, here's a case to prove the cynics wrong.

Bondy Cartage, a Windsor-based carrier hauling in both Ontario and the United States, recently instituted a driver-training program aimed at improving economy in its city and highway fleets. After just one month, and before all drivers had been covered, the fleet average improved dramatically from 5.6 to 6.3 mpg (50.5 down to 44.8 L/100 km.

That's an 11 per cent savings before the program was even complete!

To make true believers of those cynics out there, let's make it clear that Bondy runs a slip-seat operation with 110 drivers; all in tractor trailers. It's a union shop too. Not incidently, the union was in full support of the program.

"With the job market the way it is," said the shop steward, "we need to save fuel to be competitive."

The company, led by Vice President and General Manager William Bondy, hired Ken Hellawell as a consultant to co-ordinate the program and update all drivers. Extensive use was made of Trucksave material, particularly the *Easy Goin'* audio-visual presentation.

The consultant also showed the slide program to maintenance staff, dispatchers, dock men and foremen to make sure that everyone understood the fuel-saving effort.

In practice, drivers were taken one at a time to view the slide show and were then given a short test ride and demonstration, all of which took a little less than two hours. The consultant explained he would do a full road test of each driver in the following weeks, with a report to go into the driver's file.

During the preliminary tests, some drivers were able to improve in specific areas such as transmission handling, and this was done prior to the more formal testing.

At this point limits were set on both road speed and engine rpm at posted limits (55 mph for U.S. routes and 100 km/h for Ontario) and at the engine maker's recommended maximum rpm. Stickers displaying this information were made for the dashboard of each vehicle. All tractors had already been equipped with tachographs, which were checked for accuracy before the program began.

Naturally enough, there was at first some resistance to the program among the more experienced drivers, but this soon dissipated. It was replaced by honest enthusiasm and a spirit of competition for the most part.

"I know I saved 25 gallons on that trip," exclaimed one driver, "even though I was going faster than I really wanted to so that I wouldn't look slow or pokey to the other guys."

For the full road tests, the consultant rode with each driver on local or long distance trips from the Windsor or Detroit terminals, night or day. Emphasis was placed on progressive shifting, low engine rpm, and other such topics during these rides, which were opportunities for sharing ideas as well as testing.

Fortunately, base-line figures were available for each driver's fuel economy in the previous month, so comparision was easy. Comparative figures were posted so that drivers could chart their progress, and serious thought is now being given to establishing monthly competitions. It has been decided that new Bondy employees will be introduced to the fuel-saving program, and that road testing will continue periodically.

With such resounding initial success, and particularly with such commitment to the fuel economy effort on the part of the company's drivers, it's hard to imagine that Bondy won't reach its fleet-average goal of 39.5 L/100 km (7.0 mpg) very soon.

Just to prove the cynics wrong.

AERODYNAMIC REVOLUTION

They don't make'em like they used to.

The cars that most of us jockey around these days simply pale beside the fine specimens of yesterday.

Gone are the silver fins and chrome cowlings that added style and pizazz to the automobiles of the 50's. But what we've lost in style, we've gained in efficiency.

Fins and frills were monstrous air grabbers that caught the wind and increased fuel consumption. But gas was cheap and abundant and nobody particularly cared.

Today we care, We have to. Cost and supply considerations have forced us to take a hard-nosed look at producing energy efficient cars.

Since 1979, car manufacturers have undertaken to develop fuel-efficient cars suitable for energy-conscious consumers. Their efforts have resulted in a 10 to 30 per cent improvement in the fuel efficiency of their cars.

Through extensive research into automobile energy efficiency, the major problem areas that increase a car's drag and fuel consumption have been uncovered. These include: the underside, rear, window frames, rims and the wheel covers.

The underside, for example, is a maze of exposed suspension parts, exhaust system and drive-train components that create turbulance that can account for up to 20 per cent of drag. Ideally, these parts would be completely enclosed but as of yet, no cost-effective method of preventing heat build-up from the exhaust system has been found.

The rear is another problem area. Air that rushes over, around, and under the car creates a vacuum pocket in the rear that holds the car back. Manufacturers have combatted this problem with the development of the *fastback profile* that guides the air along in a relatively streamlined manner.

Window frames also cause problems. Manufacturers have found though, that drag can be reduced by making windows fit flush with the sides of the car rather than being indented. This has long been a feature of hand-built sports cars but was only recently found to be economically feasible in mass production.

Trim, fenders, wheel covers and other protuberances all affect drag in some way. Every automobile is different and wind tunnel testing for drag involves an exhaustive trial and error process.

Automobile manufacturers have only just begun to apply aerodynamic technology. They believe more research and testing will bring an average vehicle's aerodynamic efficiency (CD) down from 0.45 to 0.35 in just a few years.

Impossible? Not really. Already Ford has an experimental car called the Probe, on which the new Thunderbird is based, that has a CD of 0.15. General Motors also has an experimental version of the X car body, the aero-X, that has a CD of 0.285. That's 40 per cent more aerodynamically efficient than the model currently on the road.

These experimental cars give us some inkling into the design and shape of the cars of the future. We will see mud flaps, rain gutters and side trim stripped away. Wheels will be narrower and will be set in a smaller opening. Headlamps and side mirrors will be contoured, underbodies will likely be smoothed out and cars may even lose height, with passengers sitting slightly lower and losing a little shoulder room.

Until the day when all cars are ultra energy efficient, we can save money by being aware of aerodynamics. There are a number of ways in which any car owner can improve the aerodynamic efficiency simply by lowering the amount of drag. Consider these methods of achieving lower drag:

1/ Avoid fancy hub caps.

2/ Don't add large mud-flaps, bug shields, sun visors, roof racks or other drag increasing accessories. These can increase drag by as much as 13 to 30 per cent.

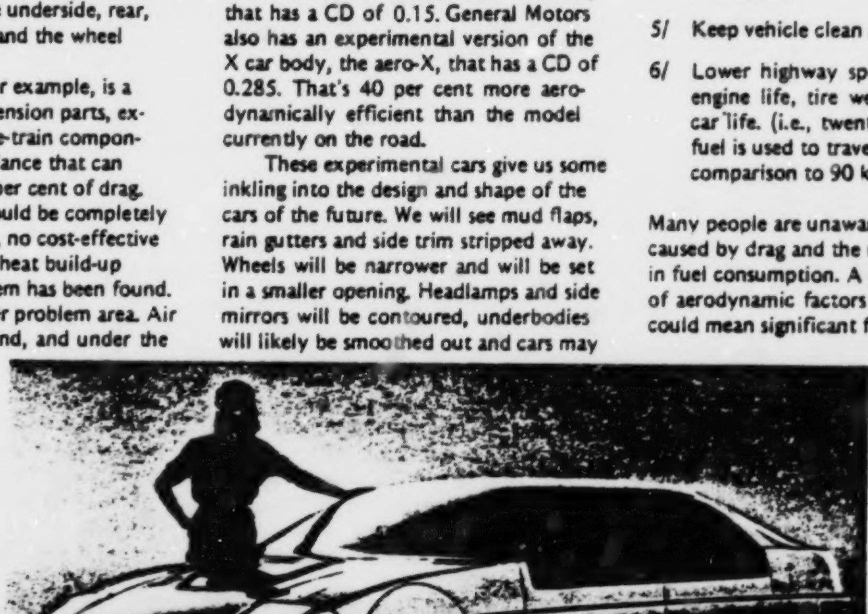
3/ Keep windows closed on highways. Instead, use flow-through ventilation. Opened windows increase drag by as much as five per cent.

4/ A blocked grill reduces drag in winter, but great care should be exercised due to the danger of overheating in mild spells.

5/ Keep vehicle clean and waxed.

6/ Lower highway speeds to prolong engine life, tire wear, and general car life. (i.e., twenty per cent more fuel is used to travel at 110 km/h in comparison to 90 km/h).

Many people are unaware of the problems caused by drag and the resulting increase in fuel consumption. A better awareness of aerodynamic factors and precautions could mean significant fuel savings.



THE WORLD'S MOST AERODYNAMIC SEDAN — Probe IV, fourth-generation aerodynamic research car developed by Ford Motor Company, has a coefficient of drag (Cd) of .15, which is roughly equivalent to that of a jet fighter.

ECONOMY CHALLENGE

A Truck Fuel Economy Competition supported by Industry and Government

THE 1983 WINNERS

The 1983 Trucksave Economy Challenge was an unqualified success, with 107 drivers and vehicles and 145 runs. The names of the winners in the 11 categories were announced and prizes were awarded at Canada's Wonderland on October 8th, 1983. The winners are as follows:

1. **COMPANY VAN/BOX 9 000 kg to 18 100 kg (19 840 to 39 902 lb)**
   Frank Haselden, International Carriers Ltd., GMC Detroit Diesel
   5.77 km/L (16.3 mpg), 12 850 kg (28 330 lb) GCW, 1.1907 L/(t-100 km)

2. **COMPANY VAN/BOX 18 101 kg to 27 200 kg (39 903 lb to 59 964 lb)**
   Walter Dowell, Consumers Distributing, Western Star Cummins
   4.21 km/L (11.88 mpg), 23 330 kg (51 430 lb) GCW, 1.117 L/(t-100 km)

3. **COMPANY VAN/BOX 27 201 kg to 36 300 kg (59 965 lb to 80 024 lb)**
   Bruce Wright, K. Lapain Investments, Ford Cummins
   3.1 km/L (8.75 mpg), 34 410 kg (75 860 lb) GCW, 0.8282 L/(t-100 km)

4. **COMPANY VAN/BOX 36 301 kg to 45 400 kg (80 025 lb to 100 085 lb)**
   Bruce Wright, K. Lapain Investments, Ford Cummins
   2.83 km/L (8.0 mpg), 36 880 kg (81 300 lb) GCW, 0.8293 L/(t-100 km)

5. **COMPANY VAN/BOX 45 401 kg to 54 500 kg (100 086 lb to 120 146 lb)**
   Harry Sparkman, Molsons Breweries, Ford Cummins
   2.41 km/L (6.82 mpg), 50 170 kg (110 600 lb) GCW, 0.8208 L/(t-100 km)

6. **COMPANY TANKER 36 301 kg to 45 500 kg (80 025 lb to 100 085 lb)**
   Graham Rowntree, Canadian Liquid Air, Kenworth Cummins
   2.8 km/L (7.93 mpg), 38 200 kg (84 200 lb) GCW, 0.9257 L/(t-100 km)

7. **COMPANY TANKER 54 401 kg and over (120 147 lb and over)**
   Bill Stugeon, Imperial Oil, Peterbilt Cummins
   1.91 km/L (5.4 mpg), 63 080 kg (139 060 lbs) GCW, 0.8248 L/(t-100 km)

8. **BROKER VAN/BOX 27 201 kg to 36 300 kg (59 965 to 80 024 lb)**
   Colin Peet, Day & Ross, Mack
   2.7 km/L (7.6 mpg), 34 050 kg (75 060 lb) GCW, 1.0741 L/(t-100 km)

9. **OVER-ALL FIRST RUNNER-UP — STOCK VEHICLE**
   Bill Stugeon, Imperial Oil, Peterbilt Cummins
   1.91 km/L (5.4 mpg), 63 080 kg (139 060 lb) GCW, 0.8246 L/(t-100 km)

10. **OVER-ALL WINNER — STOCK VEHICLE**
    Harry Sparkman, Molsons Breweries, Ford Cummins
    2.41 km/L (6.82 mpg), 50 170 kg (110 600 lb) GCW, 0.8208 L/(t-100 km)

11. **OVER-ALL WINNER — MODIFIED VEHICLE**
    Bill Capes, International Carriers Ltd., GMC Detroit Diesel
    3.61 km/L (10.21 mpg), 29 330 kg (64 660 lb) GCW, 0.776 L/(t-100 km)

The results were based on the number of litres of fuel used to haul one metric tonne over a distance of 100 kilometres (L/t-100 km).

Ontario

Ministry of
Transportation and
Communications

Ministry
of
Energy

Contact:

Trucksave
1201 Wilson Avenue
Room 324, Central Bldg.
Downsview, Ontario
M3M 1J8

Phone: (416) 248-7296

The 1983 Economy Challenge Committee would like to thank the following companies for their generous assistance in making the Challenge possible.

MAJOR PRIZE DONORS

Caterpillar-Crothers
Cummins Diesel
Custom Truck Photography
Freightliner
General Motors
Hayes-Dana
Imperial Oil
Labatt's
Mack Canada
Michelin
Molsons'
Petro-Canada
Ruhl Machinery
Western Star

OTHER DONORS

Airshield
Bell Canada
Bus & Truck
Eaton-Yale
Goodyear
Kendall Oil
Kysor Cadillac
Ontario Trucking Association
Motor Truck
Rockwell International
Tanko Automatic
Texaco

SPECIAL THANKS TO

Freightliner and Glassvan for the use of their tractor and trailer;
Ruhl Machinery for the fuel recorder
Fifth Wheel Truckstops — Milton and Bowmanville
Bloomfield Truck Stop
Husky Truck Stop, and
MTC personnel for carrying out unusual duties.

RAPID TRANSIT

by Brendon Reid, B.Sc, M.Sc.

Chief Project Planning Engineer,
Transportation Department,
Regional Municipality of Ottawa-Carleton.

BRENDON REID was trained in computer applications and has specialized in transportation. He has been working in the Transportation Department of the Regional Municipality of Ottawa-Carleton and the Transitway project has been his main responsibility for the last three years.

RAPID TRANSIT

by Brendon Reid, B.Sc, M.Sc.

I was glad to hear Louis Shallal's forecast that traffic would still tend to be with us and trip making was something that wasn't going to change very much, otherwise we would be out of a job pretty soon. That is optimistic and it means that we will be here for at least the next ten years.

A number of the speakers have referred to the association between urban structure and transportation. The big change in Ottawa-Carleton over the next ten years is going to be the continued emphasis on the development of public transit and the implementation of the Rapid Transit system which is more or less the last major effort to improve public transit within Ottawa-Carleton. Over the last six to eight years, public transit has been developed and improved and of course this ties in directly with the Regional Official Plan, which did place the emphasis on the improvement and the development of public transit. OC Transpo has more or less squeezed as much as they can out of the existing road system, by such measures as the Ottawa River Parkway, for instance, being used during the peak periods for public transit; bus lanes in the downtown; and other priority measures - Bank Street has a bus mall, etc.

I think the last important measure, now that the existing system has been here used to capacity is to implement the Rapid Transit system, or Transitway system, - "Transitway" being a word to describe a roadway for the sole use of public transit vehicles. That basic Transitway system has been identified and there is an implementation strategy for the next ten years. By the end of the current decade, or the early 1990's, it is envisaged that there will be approximately 30 km of Transitway in operation, extending in the east along the Queensway to Blair Road, in the south east from approximately Hunt Club Road along with west side of Alta Vista, in through Sandy Hill, along Nicholas, into the downtown by way of the McKenzie King Bridge and Albert Street and extending westward along Scott Street, utilizing the Parkway from Dominion Avenue to Carling and an extension southwards from Carling to opposite Algonquin College at Woodroffe.

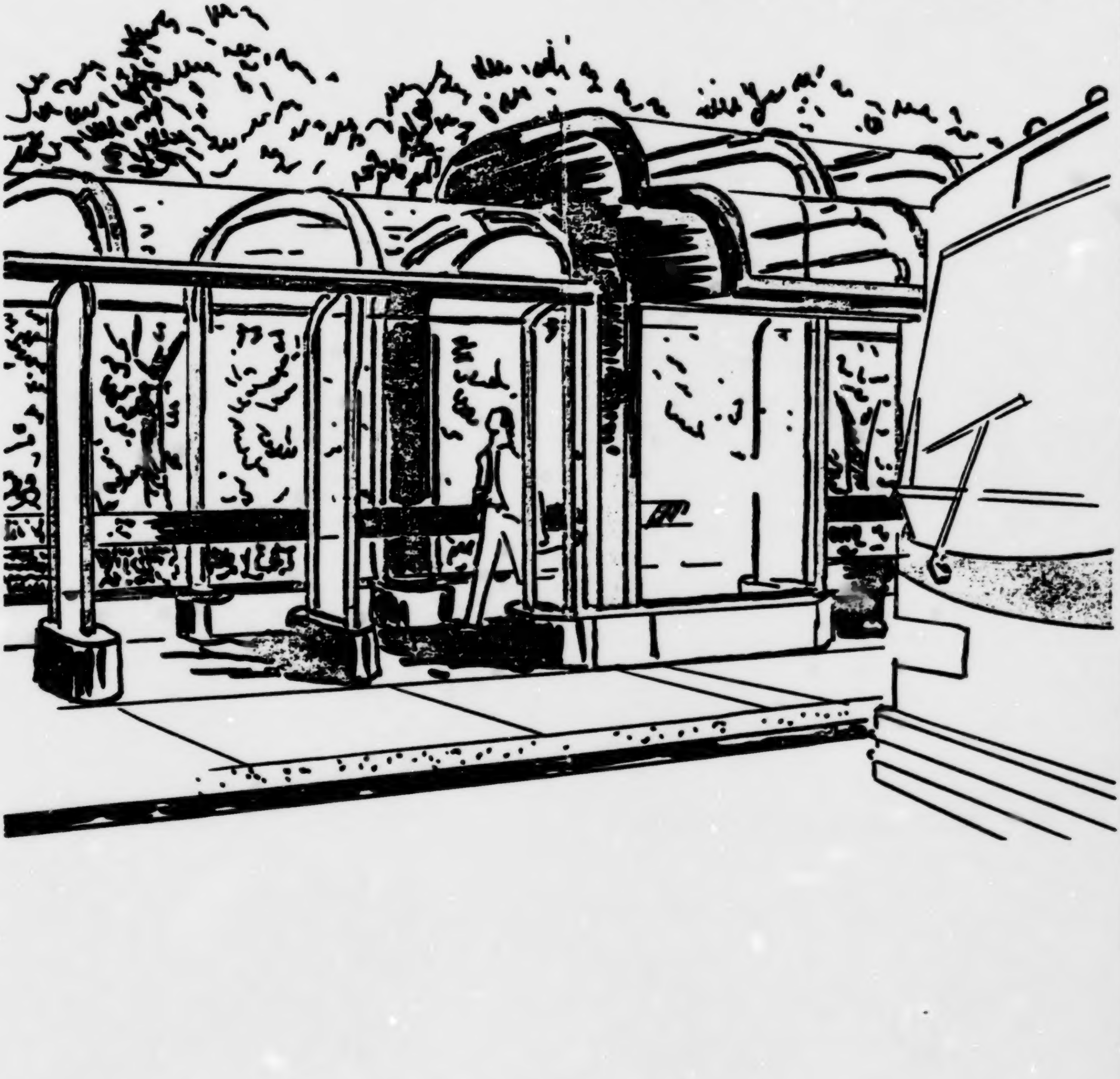
That 30 km is on programme and currently, there are two sections under construction. The section from Mann Avenue to Riverside Drive and the section from Carling Avenue in the west, to Algonquin College, have been under construction since 1981 and are expected to be operational by Fall this year. The programme will continue until the whole 30 km is in operation. Scott Street will be starting up in the summer of this year. We have already done some work in LeBreton Flats, where a minor section was constructed last summer. The total investment in the 30 km Transitway is currently about $175 million and of course 75% of that is from the Province, so there is a funding borne by the Regional tax payer of something of the order of $45 million over the ten-year period.

Within the downtown area, the strategy that has been developed is to continue to operate on the existing street system, rather than go for a tunneled section, which would be the ultimate solution, but very expensive. This strategy will involve taking over the entire length of Albert Street for public transit. There will be some minor access provided along Albert Street for servicing existing premises along it, but basically, the street will be taken over totally for public transit. Along Albert Street at specific locations, stations will be developed, e.g., at Bank Street, at Kent Street, at Elgin,

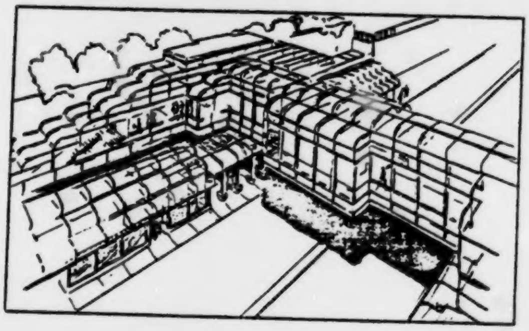
LA VOIE RAPIDE

OC Transpo

TRANSITWAY



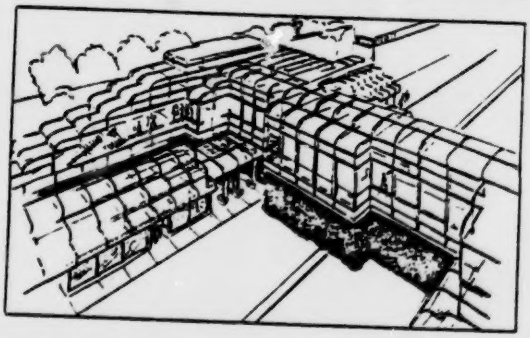
TRANSITWAY STATIONS



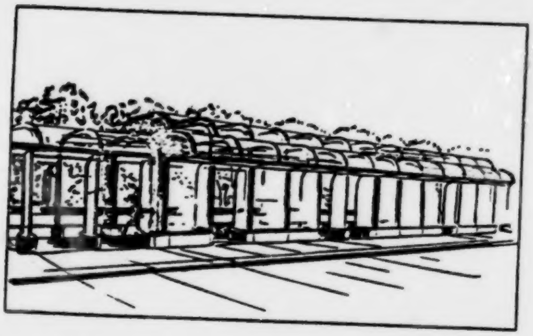
Some stations have as many as four platforms. Passengers will need to acquaint themselves with the directions of travel at each platform. In the completed station, platform layouts will be included in the information centre. The temporary situation does not allow for this signage; however, bus stops will be marked with route numbers and destinations.

In addition, the OC Transpo system map will show the layout of each station with platforms identified by number and stops identified by letter. This information is also contained in this brochure; by referring to the stop listings given for each station, you will be able to determine the stop location for your service.

FOR THE EFFECT OF THE DECEMBER TRANSITWAY OPENINGS ON YOUR SERVICE, SEE THE LISTING IN THIS BROCHURE.



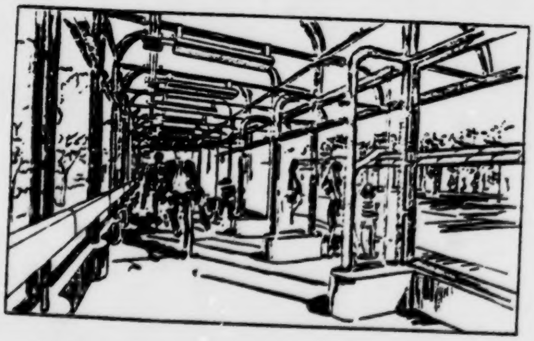
TRANSITWAY STATIONS



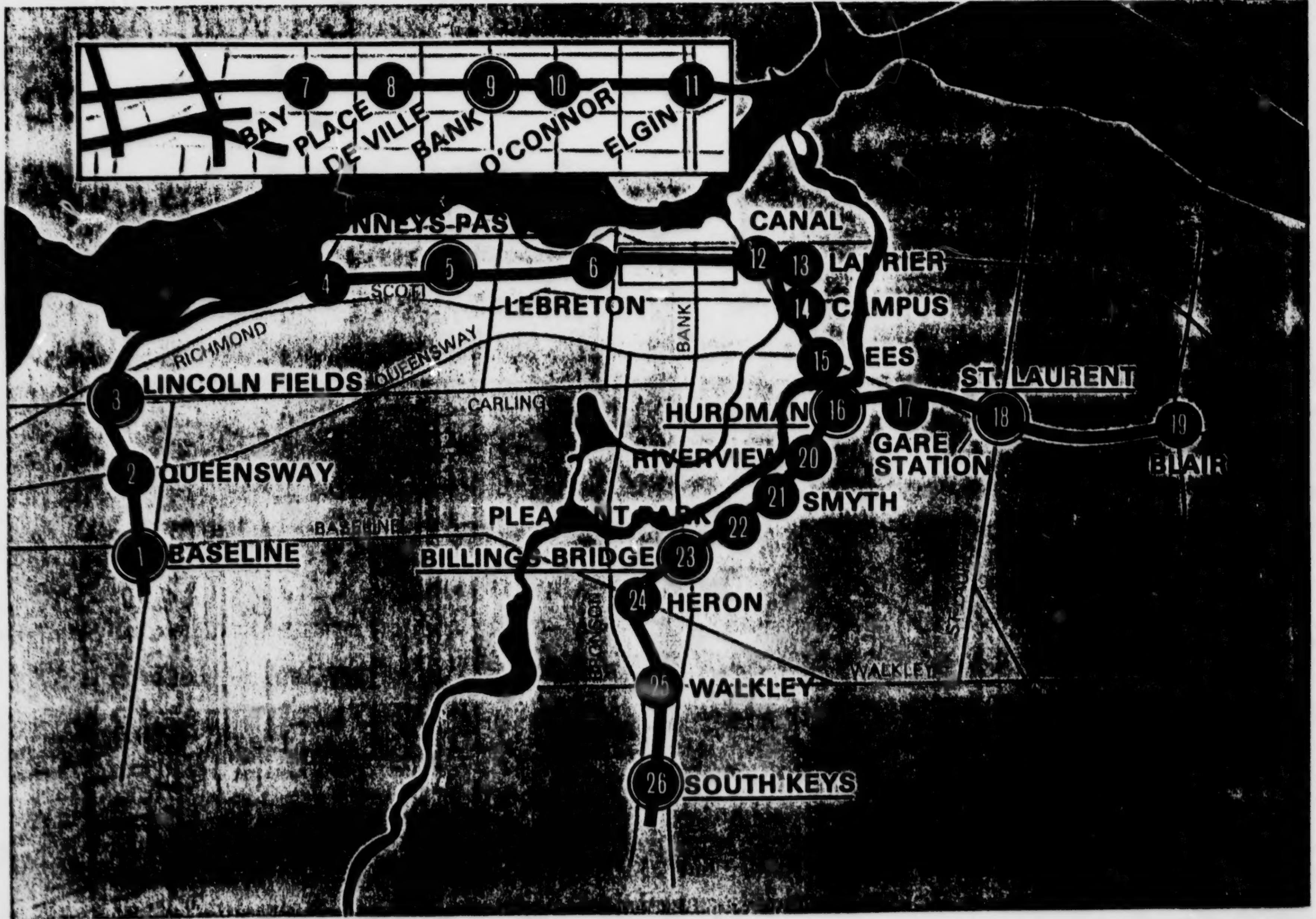
Each of the twenty-six transitway stations will provide the public with weather protected and convenient transfer locations. The specially constructed shelters will be equipped with a variety of public information items, and the major stations will include an information centre. While the stations will not be heated, they will be lighted and will, in almost all cases, be equipped with telephones.

The station buildings will be erected at Baseline, Queensway, Lincoln Fields, Hurdman and Lees some time next summer.

Unfortunately, it has not been possible to complete the stations on the transitway sections to be opened this December. Until next summer therefore the station platforms will be equipped with regular OC Transpo shelters only. It will, therefore, be the summer of 1984 before the full benefit of the transitway system to the passenger will be apparent.



1991


7
8
9
10
11
BAY
PLACE DE VILLE
BANK
O'CONNOR
ELGIN
NNEYS-PAS
CANAL
4
5
6
12
13
LAURIER
14
CAMPUS
SCOTT
LEBRETON
BANK
RICHMOND
QUEENSWAY
15
EES
ST. LAURENT
3
LINCOLN FIELDS
CARLING
HURDMAN
16
17
18
19
RIVERVIEW
20
GARE / STATION
BLAIR
2
QUEENSWAY
21
SMYTH
PLEASANT PARK
22
BASELINE
1
BASELINE
BILLINGS BRIDGE
23
24
HERON
BRONSON
WALKLEY
25
WALKLEY
26
SOUTH KEYS

O'Connor and Metcalfe. It is hoped that at these locations, stations will be integrated within either existing or future development.

What are some of the expected effects of this transit-way system? It is expected that there will be a continued increase in ridership on public transit. In the early 1970's, OC Transpo was carrying something between 60-70 million passengers per annum. It is currently carrying close to 90 million passengers per annum and it is projected that in 1991-92, it will be carrying 110-120 million passengers per annum. Looking at that in another way, in a growing area, where population is increasing, you would expect more passengers to be carried, but when you relate it to trips per head of population, the projected growth is fairly comparable to the present level - and we are talking now about targets of something of the order of 220 trips per head of population on public transit by 1992, as compared to the current 175 in 1983. So there will be more trips and a great deal of the future trip growth will be taken by public transit and of course in the peak periods, the modal split to transit will increase very substantially, although as Louis said, cars will still be carrying the bulk of the trips during the peak period, despite the fact that public transit will be carrying 30% to 40% of the peak-hour travel.

With the greater efficiency of the public transit system, two factors are expected to come about even though the transit-way system will only form about 15% of the total network - a critical 15%. It will provide a high level of service, not so much from the speed point of view - which will improve - but especially from the reliability point of view. The transit rider will know that once the bus gets to the Transitway, there isn't going to be any traffic to interfere with it - it will be totally operating in a traffic-interference-free area. The reliability and the increased speed of operation will be the main improvements to public transit, which I think will make it more and more attractive to the travelling community.

As a result of these improvements, OC Transpo is envisaging a considerable increase in ridership. The ability to move buses more efficiently at faster speeds, means that you do not need as many additional buses as you would otherwise need, to move the same number of passengers. Also envisaged at OC Transpo is the introduction of articulated buses as a major proportion of the fleet. A combination of larger buses and greater speed will in fact mean no increase in the fleet size, between now and 1990. The existing fleet size of about 800 buses, will probably stabilize at about 750 vehicles, but over the ten-year period, the ratio of articulated to standard buses will increase, as more articulated vehicles are brought into the system.

QUESTION: Will there be a range of bus sizes to ensure efficiency?

ANSWER

Yes, but obviously the larger buses will tend only to be used in the peak periods. There will be a mixture of bus sizes (30 feet, 40 feet and 60 feet long) with the use of the smaller ones during the weekends and off peak periods and the larger ones coming in and supplementing the service that is necessary during the peak period. One interesting statistic in relation to the system, is that OC Transpo is in fact the eighth largest transit system in North America, in terms of annual ridership, but it is 74th in terms of population served. That is a measure of just how important is the public transit ridership in this area. On the technology side, the Rapid Transit system is based on a bus technology. We did examine the potential for having a

Light Rail system, such as the one introduced in a couple of Canadian cities - Edmonton and Calgary - it was considered that the bus-based system was the most appropriate for the area in view of the projected rate of growth, etc. The luxury of having a Light Rail system would require an additional $25-30 million per annum to operate.

QUESTION: Has any other municipality of any size in North America, chosen a bus technology?

ANSWER

I think Ottawa-Carleton is quite unique from that point of view. It will be interesting to have a contrast between the Bus Bay System of Ottawa-Carleton and the Right Rail Systems of Calgary and Edmonton. It is true that the investment in public transit is $170-175 million over the next ten years in current dollars, but by the time it is spent, numerically it is probably going to be at least twice that amount.

Moving on quickly to the other aspect - dealing with the arterial roads - there will be a gradual implementation of the Regional Official Plan. There has already been a mention of the Hunt Club new bridge, over the Rideau at Hunt Club; there will be a gradual extension by the Ministry of Transportation and Communications of Highway 417, towards Orleans, to cater for the rapid growth that is expected to occur in that direction. Work is currently underway at the Jean D'Arc interchange and they will commence Champlain Street in a couple of years' time, as the town centre there continues to grow. From the Ministry's point of view, there is the possibility of a Highway 416 being constructed in the Cedarview corridor, not so much from the actual traffic need point of view, but more from the image and the requirement to have good freeway-to-freeway connections in Eastern Ontario, connecting Highway 401 to 417 and providing a good connection into the Capital Region.

From the point of view of public transit across the Ottawa River, we don't envisage any major change there. We have not identified any long term location for a Transitway, but there will be a link across the Ottawa River eventually. Public transit will continue over the next 10 to 15 years, to operate on the existing street system, using Bronson Avenue, the Portage link and the Chaudiere Bridge itself.

GA:smr-3
D2D123

RECREATION AND TOURISM

by Jack R. Wright, BA, MA, PhD, MCIP

Professor,

Recreology Department

Faculty of Arts

University of Ottawa

Prof. JACK WRIGHT was educated in urban planning and recreology. He has taught at the University of Waterloo and lectured at many Universities. He has acted as the Director of the School of Urban and Regional Planning of the University of Ottawa from 1978 to 1980 and he presently teaches recreology in the same University.

RECREATION AND TOURISM

by Jack R. Wright, BA, MA, PhD, MCIP

I should like to start by stating that I am not as optimistic as some of our previous speakers were about leisure time. Ten years if ago you had said that automobile traffic will increase significantly because of leisure time, I might have gone along with you. But now, all the indicators are that by the year 2000, the world will be pretty well the same as it is now. We are not going to see the significant shifts to the 24-hour week and the 4-day weekend. I think the reason is very simple, because of the current economic pressures that are upon us. When that shift will occur, I am not at all certain.

I think it is extremely important to understand the context in which we are talking about leisure, tourism and recreation in the kind of society and kind of uncertainties we are living in today.

Firstly, international travel has suffered, as indicated by the number of overseas trips - although it seems the cost is down this year because of fuel prices declining. The other factor is the Canadian dollar at U.S. $0.81. We are seeing an increasing number of overseas visitors, particularly from the European countries, from Japan in the west, and of course from the United States. We are seeing less national travel within Canada. Campground figures are down in the Canadian Rockies. We are seeing shorter travel visits by Canadians and Americans . Which suggests to me that the near future - and in the future to the year 2000 - the major focus is going to be on the regional scale. I think if there is going to be an emphasis, it will be on the day-use and the weekend-travel trip. I think the cottage is here to stay and we are going to find a way to travel to it, no matter what happens.

In 1970, Eric Trisk published an article in PLAN CANADA describing the shifts in trends and society attitudes of Canadians. He talked about the shifts from materialism to humanism, from conformity to individualism, from narrow interest to a wide range of interests, amongst other factors. I remind you that this study was done in Canada for the period 1930 to 1960. I am not altogether certain that we should pay quite as much attention to that listing as we have in the past. In other words, in a current world of caution and uncertainty, I don't see the great shifts to cooperation that he predicted and I don't see the great shifts to less material consumption that he predicted as examples.

There is an apparent shift in the recreational field from the organized to less emphasis upon organized activity - to the spontaneous, family-oriented, individualistic kind of pursuits.

There is also another myth that we have to be careful about. People in the planning field are always concerned about all these new activities that may come along and place extra demands on all the existing open spaces. The question I always raise is: "Name one activity in the last ten years, or even twenty years, that has profoundly shaken the world of recreation, in terms of placing an unreasonable demand on urban open space. Are there any?" While there are new and innnovative activities, they really haven't offset the need for open space, nor created more demands than exist already. What has changed is the time available and the desire to participate. Yes - bicycling might be one activity, creating a need for lineal open spaces. Cross country skiing is normally an extra-urban activity. The point is that as long as we have the "room" we can always change the "furniture". I think that is what we are really into, in this whole business of planning.

Another couple of points I would like to make, which I think are extremely important to look at, as we are talking probably more in beliefs and values, even mores and folk-ways if you would. This whole idea that more and more - and there seems to be pretty good evidence of this - society is looking for a sense of roots and a sense of place. And people are looking more towards an environment where they can relate to the human scale and where the scale is of measurable terms. I think this is a factor in the Ottawa scene. This sense of tradition, the sense of community that we have almost lost, more and more seems to be returning and the indicators are to be seen in terms of preservation and historic restoration. The desire to retain some of the indentity of the urban environment, as we knew it from the past. There is an increase in the number of citizens approaching the age of 65, so that by 2015, the '65-plus-population' of Canada will reach 11% or 12% (where it is now about 9%). That is significant and the impact on open space and on recreation and tourism is also going to be significant.

We also know more about recreation patterns in larger municipalities in Canada than we do in small towns. There are some interesting facts emerging there. There are something like 8,000 small towns in Canada. Not only have they stabilized, but many have grown. The "for sale" signs in municipalities north of Toronto is increasing to some degree. As the population shifts up to this 60-65 retirement age, it is a lot cheaper to live in small towns than it is in

Toronto, or other larger centres, with lower real estate prices, cost of living, etc., leading to a return to the small town. A sense of place, could be a major factor along with the economic factor.

I suspect there could be something to that. Then when you consider the shifts in advertising on T.V., watch what age groups are being considered. Freddie and the boys are now in their late 30's, they are not in their twenties. The age factor is shifting and moving upwards and we are starting to see it. The impact on the leisure field, I think, is going to be very profound. The whole shift towards priorities for citizens that is a completely different context than we understand it today. In terms of transportation and distances, I think the day-user and the whole matter of regional recreation is going to come into its own. I don't see a great problem in Ottawa with the number of opportunities here. I don't see that as a major factor, that is going to upset and cause any problems in terms of planning.

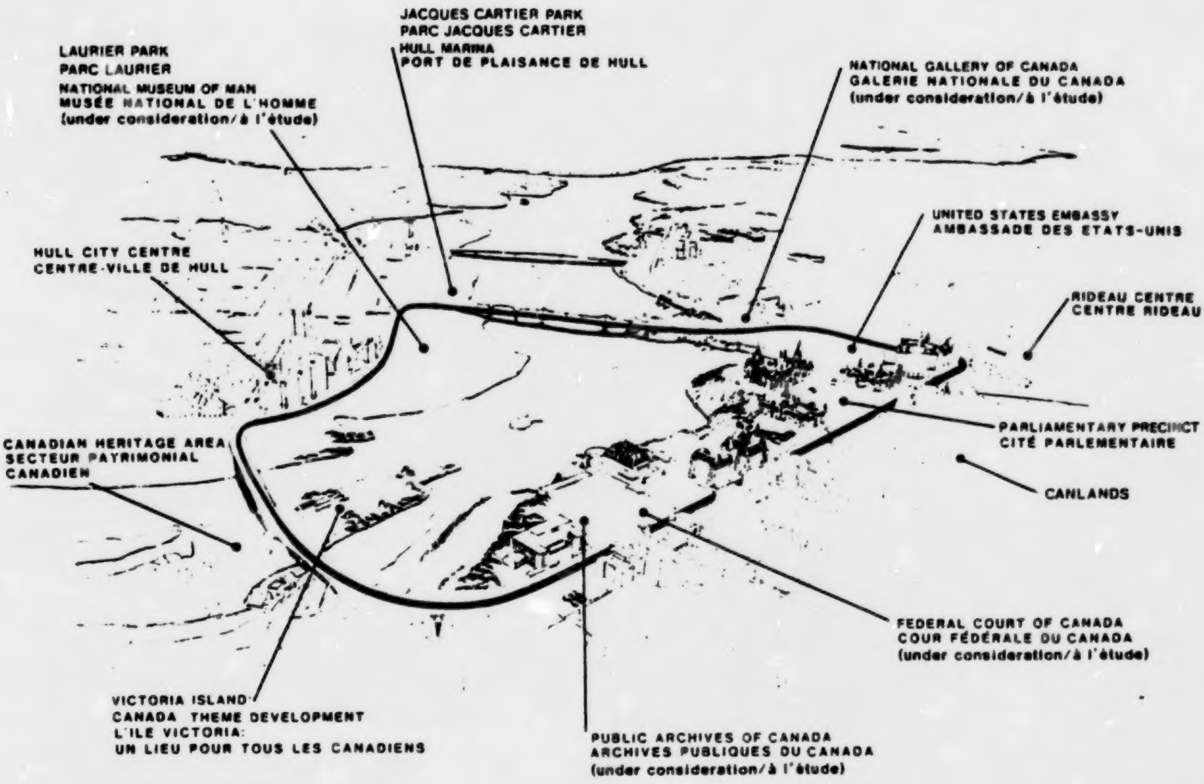
The other point is, with less dollars and a focus on efficiency of public expenditure, there is no question that we are going to have to start to lean more on the private sector and the trends are already indicating that. Athletic facilities are being included in condominiums, with the saunas and the exercise rooms. We are starting to look to more centralization of facilities, the sharing of facilities, especially in the rural areas. Whether they like it or not, every small town and village can't afford a swimming pool. Neighbouring municipalities are going to have to get together and do something together.

Prospects for the Core Area of the Capital

The National Capital Commission is reassessing federal planning policies and development opportunities for the Core Area of the National Capital Region. The Core is the area bounded by the Alexandra Bridge, Sussex Drive, Wellington Street, the Portage Bridge and Laurier Street, on both sides of the Ottawa River (see sketch). This update is timely in view of various proposed and anticipated federal and other projects and the need to place them within an overall planning context.

In 1971, the Core Area Plan adopted in principle by the Government envisaged an imaginative mix of cultural, commercial, residential, administrative and diplomatic activities on both sides of the Ottawa River linked by a network of movement systems. Since then, strategic properties have been acquired, the Portage Bridge between Ottawa and Hull has been built, major mixed developments have been completed, and heritage conservation and improvement measures have been carried out. In addition, environmental improvements and landscaping have been undertaken, the temporary Second World War buildings have been demolished and a first phase inner-city residential community has been developed at LeBreton Flats.

Today, the attention is turned towards three priority projects. One is the consolidation of parliamentary facilities within a still to be defined Parliamentary Precinct. Various approaches to preparing a master plan for such a Precinct are currently under review. The other two involve the construction of new homes in the core area for the National Gallery of Canada


LAURIER PARK
PARC LAURIER
NATIONAL MUSEUM OF MAN
MUSÉE NATIONAL DE L'HOMME
(under consideration/à l'étude)
JACQUES CARTIER PARK
PARC JACQUES CARTIER
HULL MARINA
PORT DE PLAISANCE DE HULL
NATIONAL GALLERY OF CANADA
GALERIE NATIONALE DU CANADA
(under consideration/à l'étude)
UNITED STATES EMBASSY
AMBASSADE DES ETATS-UNIS
HULL CITY CENTRE
CENTRE-VILLE DE HULL
RIDEAU CENTRE
CENTRE RIDEAU
PARLIAMENTARY PRECINCT
CITÉ PARLEMENTAIRE
CANADIAN HERITAGE AREA
SECTEUR PAYRIMONIAL
CANADIEN
CANLANDS
FEDERAL COURT OF CANADA
COUR FÉDÉRALE DU CANADA
(under consideration/à l'étude)
VICTORIA ISLAND
CANADA THEME DEVELOPMENT
L'ILE VICTORIA:
UN LIEU POUR TOUS LES CANADIENS
PUBLIC ARCHIVES OF CANADA
ARCHIVES PUBLIQUES DU CANADA
(under consideration/à l'étude)

and the Museum of Man. Studies of possible sites are underway to determine how these projects can have as beneficial an impact as possible on the Core Area as a whole.

Additional long-term planning studies are directed towards consolidating a strong national presence focussing generally on the Capital's major natural feature, the Ottawa River. Unused or temporarily used sites within the inner Core Area present opportunities for meeting both future federal accommodation requirements and achieving an urban design worthy of Canada's Capital. Cases in point are the area between the National Library and the Supreme Court on Wellington Street, LeBreton Flats, Victoria Island and Richmond Landing, Laurier and Jacques Cartier Parks in Hull, Nepean Point and the "Canlands", located south of the Sparks Street Mall.

In order to integrate all these proposals, the concept of a "ceremonial route" is being formulated along with a special transportation system linking the various facilities. Public amenities and improvements to open spaces are also elements that are being given detailed consideration.

The current task is to develop a coherent and comprehensive framework that will direct the planning and future development of federal lands located in the most strategic and symbolic sector of the National Capital Region. The challenge is to develop an image of the future capable of inspiring all Canadians.

Another Successful Joint Project

The new water treatment and sewage system plant in Gatineau, Quebec, officially opened at the end of October.

It is the result of a cost-sharing agreement between the Government of Quebec, the Outaouais Regional Community, the Canada Mortgage and Housing Corporation and the National Capital Commission.

In addition to improving the quality of the Ottawa and Gatineau rivers by controlling pollution, the project has provided a necessary component of the infrastructure required for the massive revitalization of this part of the National Capital due to the rapid growth in recent years of Hull, Aylmer and Gatineau, and the increase in federal building.

The National Capital Commission's financial involvement totalled $52.4 million, about one third of the total cost.

Official opening of the new Gatineau water treatment and sewage plant. Left to right: Serge Lapointe, CRC, Guy Lemay, Commissioner NCC, Mrs. Goulet, CMHC, Hon. André Ouellet, Minister of Consumer and Corporate Affairs Canada, Lawrence Gangur, CRC, Hon. Adrien Ouellet, Quebec Minister of the Environment, Gaston Isabelle, M.P., Hull, unidentified, Hon. Bud Drury, Chairman NCC, Jean-Yves Gougeon, alderman, Hull, Ian Dewar, General Manager NCC, (seated) Pierre Ménard, President CRC.

NCC implements 6 & 5 Program

The Commission is a major landlord in the National Capital Region, administering approximately 1200 leases, many of which are on an annual basis. Since the inception of the federal restraint guidelines, the Commission's Property Branch has been working closely with Canada Mortgage and Housing Corporation, Public Works Canada, and the Treasury Board to ensure that the restraint guidelines are implemented in accordance with government policies.

Rent rollbacks have been processed where they were applicable under the restraint guidelines. Future lease renewals and new leases will reflect restraint guidelines.

Coming Events

Winterlude 1983

Since its inception in 1979, Winterlude has succeeded in its mandate to present activities which reflect regional and national socio-cultural and historical characteristics. As such it has become both a regional and national event, drawing participants from all across the country. In addition to brightening our long winter months, the festivity has had a significant economic impact on the region. A study of last year's celebration revealed that Winterlude had boosted the local economy by between 9 and 12 million dollars.

The fifth Winterlude celebration will take place from February 4th to the 13th. Again this year, the fun and festivities will include the Ice Dream snow sculpture competition, the Canadian Club Classic, barrel jumping, speedskating and the International Old Timers Hockey Tournament.

New activities on this year's calendar of events include the Winterlude Triathalon consisting of skiing, skating and running a 15 km course, the Winterlude Solar Café, a natural energy rest area, and an International Sculpture Square featuring the work of five champion sculptors.

Posters and brochures are available from the NCC Public Activities Division at 161 Laurier Avenue West and from the Visitors' Centre at 14 Metcalfe Street. A detailed schedule of events will be available in mid-January.

1983 Winterlude
Bal de Neige
Canada

The Gatineau 55:
International Cross-country Ski Race in Gatineau Park

CANADA
GATINEAU 55

The National Capital area will be the host of an international cross-country ski race this winter. **Gatineau 55**, the Canadian stop on the renowned World Loppet circuit, will be held in Gatineau Park on February 19, 1983.

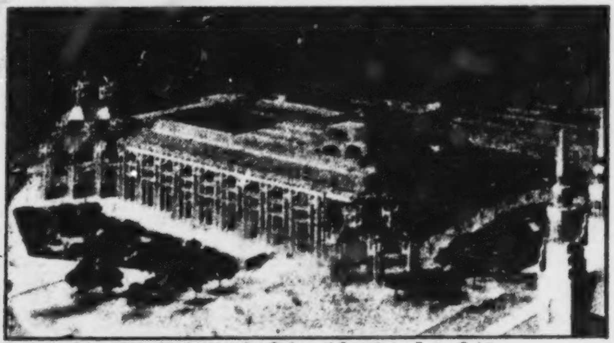
The NCC and the Canadian Ski Marathon Inc. have joined forces to offer what should prove to be a very interesting and challenging course. The race takes place along 55 kilometres of the Park's 200-kilometre network of trails.

The World Loppet is a circuit of ten cross-country ski races, each held in one of ten member-countries throughout Europe and North America, and attracting some 70,000 skiers each year.

The NCC expects to attract world-class competitors to the Canadian event. However, in order to allow all skiers - especially those in the National Capital area - to take part in the **Gatineau 55**, two courses have been planned: the 55-kilometre "competition" race and the less-demanding 30-kilometre "participation" event.

Registration forms are available at 14 Metcalfe Street. For more information contact the NCC's Gatineau Park office at 827-2711.

Exhibition



A model of the design for the National Gallery of Canada by Parkin/Safdie

A New Building for the National Gallery of Canada

The model for the new National Gallery building will be on exhibit with plans, earlier designs, alternate designs and architect Moshe Safdie's drawings and notebooks illustrating the design process, as well as sectional models of exhibition spaces, shown for the first time

15 December - 15 March

National Gallery of Canada
Elgin and Slater, Ottawa (613) 992-4636
Open Tuesdays to Sundays 10 to 5. Thursdays 10 to 9. Closed Mondays except holidays
Wheelchairs available for the handicapped: ramp on Albert St

National Museums of Canada
Musees nationaux du Canada
Canada

One last point I will make. The people in the recreational field used to get hung up on programme and activities. There has been a very definite shift to a much more humanistic outlook in this whole area. As a reflection of the kind of society we are moving into, we are becoming more personalized and recreation is coming to be seen as an experience, as a means to and end. A means towards self-development and self-fulfillment. Those were words that Maslow talked about a long time ago, but more and more, the recreational field is moving in that direction. We realize that we are trying to satisfy people's psychological needs in different ways. We all don't have to play hockey on the arena a block from home, we can do other things, in an organized way.

Let us now turn briefly to tourism. At the moment in Ottawa, we have something like 2,000,000 visitors a year with about 1/3 from outside the Region. In other words, 660,000 persons. So Spring Festival and Winterlude, despite the great numbers, the great bulk are still from Ottawa. That is increasing at about 2% per year. Next, let's look at the major tourist attractions for the Americans. The Parliament Buildings is the big one with about 800,000 visitors a year. The Art Museum 500,000. The current Art Gallery 350,000 and with the new one proposed for Nepean Point, I think you are going to see a substantial increase in that figure. Consider the Museum of Man - that presumably goes to Laurier Park in Hull - and along with the Art Gallery, you are talking about an expenditure of $185 million which will probably end up at $250 million before both are completed. There is no question in my mind, that there is going to be a significant input to the core area, in terms of visitor attraction. Then you have the Spring Festival, which has really grown in the last few years. The Winterlude is now approaching the participation or attendance of the Quebec Carnival. The upgrading of current museums and looking into the future, the heritage attraction of the Mile of History. There is no question in my mind that the whole visitor input and the tourism factor is going to be, I think, significant to the point where we may see that 2% figure go up. Whether it is 2.5% or 3.0% I'm not sure. But I suspect it is not going to drop. It is going to go up and it is going to increase. With the Rideau Centre, the Conference Centre, the hotel situation in downtown Ottawa and the tourist area, there is little doubt in my mind that there is going to be a pretty significant increase in visitors.

I think the major factor as always, will be that Ottawa is the Nation's Capital and over the next ten years, certainly over the next 25, there is going to be a significant increase in the number of opportunities that are available for visitors. Along with that of course is the tourist dollar that comes in, and I think it is going to be a pretty major factor over the long term. It is going to continue to be a very major factor here, that will ride straight through the ups and downs of high-technology and manufacturing and all the other factors we have to consider. Considering it is still a government town and a white collar town, the economy is stable. It seems to me that it is a very positive plus factor that will provide a solid base for steady growth in the tourist/recreation dollar.

POLLUTION

by Harry S. Loijens, M. Sc., P. Eng.

Co-ordinator,
Rideau River Stormwater Study,
Regional Municipality of Ottawa-Carleton.

HARRY LOIJENS was trained in hydrology in the Agricultural University of the Netherlands and later specialized in engineering. He joined the Regional Municipality of Ottawa-Carleton in 1975 and since 1979, he has been the Co-ordinator of the Rideau River Stormwater Study.

POLLUTION

by Harry S. Loijens, M. Sc., P. Eng.

First of all I have to say that I feel a bit ill-at-ease here in this audience, because I'm not a planner by any means and just about everybody around the table here appears to be. So having said that, I will try to limit myself to what we have been doing in the last three years, as part of the Rideau River Study and talk about urban pollution.

'Pollution' is a very vague term; we have heard of all kinds of pollution and I think for this audience I would like to limit myself to pollution from the urban environment, as it affects, say recreation and particularly, swimming in the river. Then again, I limit myself to the Rideau River itself.

It was about ten years ago that various beaches on the Rideau River in the downtown area were closed to swimming. Just to refresh you memory, the reason they were closed was not because pollution was increasing - in actual fact, the 'pollution load' of the river has been decreasing over the last 15 years. In addition, the bacteriological standards were raised and beaches couldn't meet the standard.

Our study has two aspects, one is to preserve the river quality wherever acceptable for swimming in the future, and the other aspect is the lower area, where the beaches are closed and we are developing a pollution control strategy for re-opening these beaches. To make a fair assessment of our outcome, I can say without committing myself or anybody in the study, that urbanization - and particularly the urbanization we know from the older urban area - is more or less incompatible with swimming in the same body of water itself. Too many sources of pollution, which in one way or another we can see in the fact that it is almost impossible to meet the swimming standards below Bank Street, unless we are prepared to spend an awful lot of money. Even then, we are not sure whether it will be a success.

It is a different story in the developing area upstream where we do have opportunities to control whatever we want to control, if we are willing to pay for it. Most people who buy in the suburbs - for example, in Barrhaven - pay $500 to $1,000 per lot on stormwater pollution control, directly when a house is purchased.

Another thing which has to be answered, and I think this particular audience would be very perceptive to it, is whether people - given the opportunity that we could reopen beaches - would they desire to go back there and swim in the river? Because we all know that the Rideau River is eutrophic. You can see it: algae, greenery and water temperatures are high, so that you are swimming in a king of soup. I wonder whether the people, given the choice, would not prefer to go somewhere else? We have so many nice, clear lakes around us and even rivers which are much better in this regard that the Rideau River. This kind of question has to be asked before any substantial amounts of money are committed. Maybe people prefer to swim somewhere else, in the Gatineau perhaps. Should we consider bussing people there, as they are doing in the Fall, to view the colors in Gatineau?

I think these are some of the kinds of questions which need to be answered (after our study is completed) by the local community. I don't think these are issues, which we, as a technical group, can or want to answer. I mean it is for the local people, the politicians and the planners to bring these issues forward and put them in their proper prospective. Certainly, from a technical point of view, many things can be done, given sufficient funds.

QUESTION: The last time I went to the Gatineau Hills, I was stopped and handed a questionnaire. One of the questions they asked was "How often do you come here and the method you got here?" To what extent do people, still think of getting in a car and driving to their recreation? What is the modal split for recreation? What percentage by bicycle, or walking, or by bus? Within the City, a lot of people use the Y.M.C.A. by picking up that shuttle bus from downtown to the Gatineau Hills and so forth. It seems to me that there are more and more people getting away from driving to their recreation, with the exception of cottages.

ANSWER:

In terms of transporation, the percentage is very small. Below 0.1% in terms of total trips in a given day. But in terms of the actual location where people are going, it is a question of capacity versus amount. There are many locations where at certain times they peak. I am thinking on the Quebec side, Lac Philippe. There are, as you said, abundant locations for people, but I find it interesting that most people tend to want to go into the closer spaces, next door almost, rather than travel 10, 15, or 20 miles.

The older beaches along the river were really small community beaches in the old days. The mode of travel, the car was not as prominent as it is now, so they may not have had many alternatives in terms of recreation and transportation. Although the energy cost is increasing, people may still want to get out of the City.

I would say that over 95-96% travel by car to recreation facilities. In the urban area, a lot of them are cycling, walking trips for instance, to Mooney's Bay, etc. Yet I think we shouldn't forget all the things that children do. We prefer them to go by themselves rather than being driven there.

QUESTION: Britannia Park at one time was the terminal end of the industrial railway, that was a good excursion in the twenties. That day is over when we had all the diversity of choice. It seems to me that Ottawa is very unique in the range of opportunities offered, but there is only one little factor that upsets me. Swimming seems to be still the number one outdoor activity at the top of everybody's list, but there is no place to swim outdoors.

ANSWER

I'm not saying it is all doom and gloom, forgive me if I gave that impression. Don't forget we have a large beach at Mooney's Bay and we will be recommending say, a similar facility not too far away, at Brewer Park. Once you go further into the City from there, the story changes. There are alternatives and there is a possibility within the city environment to create a river beach, which can be used by many people. Regarding the smaller beaches, you know they would still be neighbourhood beaches. There are simply no sufficient facilities around, in terms of parking, access and so on.

QUESTION: They say that the water quality in Toronto is really not even drinkable. To what extent do we have the same problem here in Ottawa? Is our water safe?

ANSWER

In terms of bacteriological quality, water is very very good, upstream from the City. You can see the urban effect, if you are looking at the river downstream from Ottawa. There, the pollution levels go up substantially.

QUESTION: Is Aylmer or Hull still dumping sewage?

ANSWER

They were supposed to put a sewer system in last Fall.

QUESTION: Do snow trucks or salted sand trucks have an effect on pollution?

ANSWER

Well, they have an effect on pollution of course, if you dump more salt in the water. We didn't really deal with that because we were simply limiting ourselves to the summer period, recreation and bacteria. We were not studying other impacts; actually we did look at other sources along the Rideau River, but there was noting to worry about. Levels of heavy metals are almost all below the detection limit.

Again we have no heavy industry and Ottawa is not very densely developed. We don't seem to have the problems which large urban centres do have.

QUESTION: Would 150% expansion of Ottawa kill the rivers by pollution?

ANSWER

I don't think so. Over the last years our building techniques in developing new areas have improved and our standards are much higher. In addition, we have come to expect that pollution loads to the river should not increase. We can achieve that by various measures which was not the practice in the past, when you simply put a sewer in the ground to the nearest river. We should retard the water before it gets to the river. You get natural filtration - you get bacteria die off. For example, one of the techniques is to use ultra-violet light for disinfection of water. That is exactly the same as the sun is doing for free. What I am saying is we should make as much possible use of the opportunities offered by the local environment to achieve control.

SOCIAL PLANNING

A social planner's perspective on Housing and Lifestyle Groups

by Nadya Tarasoff, BA, BSW, MSW

NADYA TARASOFF was educated at McGill University of Montreal, University of British Columbia and University of Manitoba. She has worked with the Community Welfare Planning Council and since 1971, she has been the Research Director of the Ottawa-Carleton Social Planning Council.

SOCIAL PLANNING

A social planner's perspective on Housing and Lifestyle Groups

by Nadya Tarasoff, BA, BSW, MSW

I will touch on housing but will focus primarily on what we have loosely labelled as lifestyle groups: groups which, because of similarities in age and family status, have similar characteristics in certain dimensions and thus have similar needs. First, however, I would like to express a strong concern I have been feeling, as I listened to all the preceeding presentations. All the forecasts for the eighties, with the exception of Dr. Wright, have focused on characteristics of majority population groups, i.e., that basically Ottawa-Carleton in the eighties is going to be populated by prime-aged, upper-income, male-headed families. There is very little recognition of the fact that we have a growing population of elderly and single-parent families, whose needs will be quite different from those of prime-age, upper-middle-class males.

In planning for the future, I feel it is important to be aware of the types of population groups who are going to be living in this area. To help in this type of analysis and planning, I would like to borrow from the concepts developed by Peter Homenuck, an Urban Planner from York University, who was involved in both the Eastern Community and LeBreton Flats developments. In planning, whether you are looking at housing, new communities, transportation, or location of shopping centres and other community facilities, Homenuck suggests different dimensions or aspects to be considered. There are two aspects that I feel are especially relevant. First, self-sufficiency of different population groups: to what extent are the different population groups able to meet their own needs and to what extent are they dependent on community services and facilities. For instance, prime-age males are much more able to meet their own needs that are pre-school children or the very elderly. A second dimension is physical mobility. People who are more mobile, such as young adults and teenagers, have a much larger territorial area in which to meet their needs for socialization, education, shopping, whatever, in contrast to people who are much less mobile, such as toddlers, mothers of young children or senior citizens. The similarity in these two factors, which is largely determined by age and family status, largely determines the types of needs and thus the lifestyles of different groups. Thus, the lifestyles and needs of two-parent families with children at home would be much more similar, than say, the needs and lifestyles of young, single adults, teenagers or senior citizens.

The severity of the needs of each group and the requirement for services and facilities, however, is accentuated by low income. The projections for the eighties, where the major increase in employment will be in the high tech industry, is cause for greater concern, because the groups most at risk of low income - the female heads of families and young people with limited education - are not getting the education and the training that is necessary for them to be able to make use of these new employment opportunities.

In the previous presentations, with the exception of Dr. Wright, I heard no recognition of the fact that in 1981, almost 50,000 of the citizens in Ottawa-Carleton were over the age of 65, with another 50,000 who were between 55 and 64. That is almost one fifth of our population and yet none of the projections recognized the special needs of this population group. For instance, the special needs of the older woman who is living by herself in a large family home.

Also, it seems to be the assumption that all families are two-parent families. Between 1976 and 1981, the net increase in absolute numbers in single-parent families was one and a half times the net increase in two-parent families. Right now in Ottawa-Carleton, one in five children living at home is in a single-parent family.

Another rapidly growing group is the single persons living alone. Again, between 1976 and 1981, this group increased by 38% to 50,435 people. Again, both in terms of planning for housing and for community facilities and services, this dramatic change has a lot of implications.

One of the Social Planning Council's major projects in the last few years has been the development of a monitoring system on the different types of needs in Ottawa-Carleton, which culminated last year in the publication of TRENDS '82 in this publication, we graphed some 100 different indicators for 30 different need areas to get an overview of what the major needs in Ottawa-Carleton are. We attempted to be as comprehensive as possible and have looked at everything from income and employment, housing and the needs of different population groupings, to areas such as public transportation and the environment. There are a lot of areas in which we would like to get more data, such as the cost to the local taxpayer for general welfare and social services.

We are also organizing training sessions for the local agencies in the use of microcomputers for data management so that hopefully, we can get data on the characteristics and needs of the clients of the different agencies.

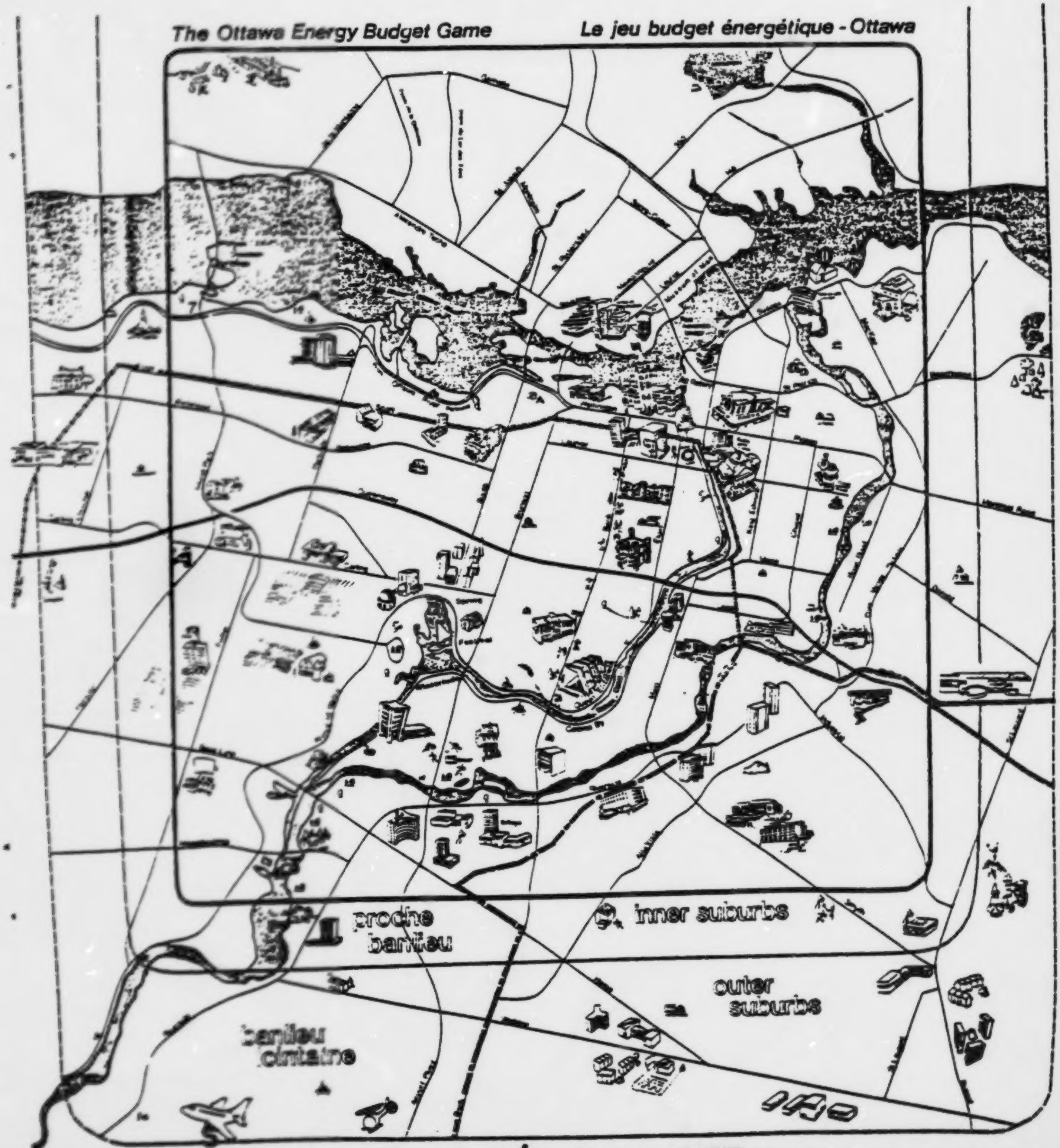
In sum, in planning for the 80's, I believe it is imperative that we consider the composition of our total Metropolitan society. This includes those groups who are in the majority; but it is absolutely essential for the well-being of our social fabric, that we also devote our attention and humanness to the needs of the many who are not in the majority.

GA:cse-2

D2D124

APPENDIX

Map of the City of Ottawa
(showing projected features, which in accordance with the Symposium, are planned for the decade 1982-1992. This map served as the baseboard for the Ottawa Energy Budgets Game - see Appendix 3 in APPENDICES volume).


The Ottawa Energy Budget Game
Le jeu budget énergétique - Ottawa
proche banlieu
inner suburbs
outer suburbs
banlieu lointaine

REDUCED TO 1/4 FULL SIZE

Number/
Numéro

2

ONTARIO MINISTRY OF MUNICIPAL AFFAIRS AND HOUSING

ONTARIO MINISTRY OF ENERGY

CITY OF OTTAWA

ENERGY USE AND LAND-USE PATTERNS IN THE CITY

ECTP Study Programme

FINAL REPORT

October 1983

City of
Ville d' **Ottawa**

conservation pipeline

Knowing how our lifestyles may change will help City Council plan for a more convenient city.

Brief were the days of the oil glut bonanza at the gas pump . . . long-term gasoline price projections of the Ontario Ministry of Energy, indicate 240% to 260% increases over current prices by the year 1992.

How will your lifestyle fare with such gasoline price hikes?

To help you visualize the lifestyle change that you may have to introduce to your household to cope with this situation, the Energy Planning Section at City Hall will send you:

The Ottawa Energy Budget Game

in which the players try to recapture all the activities in their lifestyle DESPITE reductions in car mileage reflecting foreseeable gasoline price hikes. By the year 1988 you may not only have converted your car to run by propane, you may even have to buy an electric or a hydrogen car.

If you live in Billings, Dalhousie or Capital Ward, your household may be among those selected to take part in this very enjoyable survey. First you will record your trips to various facilities over the past year on a Survey Form. Then you will play the Ottawa Energy Budget Game of combining visits to convenient facilities in ROUND-TRIP fashion. The combinations you suggest will help to plan the location of new facilities in the City, so as to increase social convenience and energy conservation in our environment.

YOUR OPINION MATTERS

Tell us how to enrich Ottawa's lifestyle Even through the Energy Tight 1980's

City Council would greatly appreciate your response to this survey. Interested households beyond the selected Wards may also obtain their FREE copy of the Ottawa Energy Budget Game by calling

The City Energy Planner
(Gary Armen) at 563-3000

A token of appreciation from the Mayor will be sent for every response.

Help to make Ottawa the Energy-Efficient Capital

FINAL REPORT

ECTP STUDY PROGRAM

ENERGY USE & LAND USE PATTERNS IN THE CITY

ACKNOWLEDGEMENTS

The Survey of Energy Use and Household Trips in 1982, to establish a benchmark for the study of lifestyles in relation to energy in the City of Ottawa, involved the voluntary response to a lengthy questionnaire by no fewer than 753 households. Dozens of junior school students carried out the distribution and collection of these questionnaires and scores of teachers saw that both these tasks were properly and punctually carried out to solicit maximum response.

The Ottawa Energy Budgets Game to establish possible changes in patterns of energy use and household trip by 1992, necessitated a symposium of 12 specialists to make projections in public and private development in the Ottawa region to that year (See 'SYMPOSIUM' volume*) and subsequently involved the employment of 20 university students and the participation of over 300 households. Many of these households played and recorded their moves in the Energy Budget Game, by themselves, without waiting for help from interviewing students, thus demonstrating a remarkable patience and sense of responsibility for the future of the urban environment in Ottawa.

A debt of gratitude is due to all these households, teachers, specialists and students. It is hoped that their expectations from citizen participation in planning the location of urban facilities, in layouts which minimize car travel, will in due course, be fully realized.

*NOTE: The full report on this Study consists of the following volumes:

1. Summary
2. Final Report
3. Symposium
4. Appendices

CONTENTS

TITLE PAGE

Executive Summary 1

INTRODUCTION: A lifestyles Approach to the Planning of Land-Use Patterns for the Energy-Tight 1980's 3

Terms of Reference 8

Definition of Key Terms 10

Methodology 11

SECTION 1: BRIEF SUMMARY OF LITERATURE

Areas of interest according to project objectives 13

Conclusion 32

SECTION 2: 1982 PATTERNS OF ENERGY USE AND HOUSEHOLD TRIP

On lifestyle and activities 33

Survey framework 38

Questionnaire design 40

Pilot Survey 42

Distribution of the Questionnaire 44

Collection of the Questionnaire 46

Reluctance to respond 46

The Response 47

Allocation to Accessibility Zones 48

Tests 49

The analysis of survey data 53

Principal components analysis 53

Identification of Ottawa lifestyles, 1982 65

SECTION 3: THE LINKAGE OF FACILITIES

The linkage of facilities as a means to promote energy efficiency 68

The benefits of clustering 70

Hypothesized clusters 75

SECTION 4: POSSIBLE 1992 PATTERNS OF ENERGY USE

How to ask questions about the future? 79

Scenaria in energy shortfall: 1982-1992 79

The Ottawa Energy Budgets Game 94

Conduct of the survey 95

Analysis of data 100

Possible 1992 patterns of energy use 102

SECTION 5: FORESEEABLE TRAVEL PATTERNS 1982-1992

Diversification of transport modes 105

Extension of multi-purpose trips 107

Reduction in frequency of activities 109

The journey-to-work: 1982-1992 115

The night-out trip: 1982-1992 124

The shopping trip: 1982-1992 128

The education trip: 1982-1992 130

Weekend and day-trips: 1982-1992 131

Conclusion 134

SECTION 6: FORESEEABLE CHANGE IN LIFESTYLES: 1982-1992

Classification of current (1982) lifestyles 135

Factors underlying the change of lifestyles 1982-1992 139

Classification of 1992 lifestyles 141

Main trends in lifestyle change 143

SECTION 7: TOWARDS ENERGY-EFFICIENT PATTERNS OF LAND USE

A. The interpretation of lifestyle changes into land-use patterns 149

Frequency of visits and linkage 151

Reliable indications of linkage 153

Patterns of distribution and linkage 154

The transport network 161

Specialized district centres 162

The residential environment 164

Retail facilities 166

Education facilities 167

Entertainment, cultural and recreational facilities 168

Employment centres 170

Urban form 172

B. The comparison of existing and foreseeable patterns of land use 175

Existing land use characteristics 173

Alternatives 184

C. The process of implementation 189

Supplementing the variety of downtown facilities 189

Extending the range of district centre facilities 191

Neighbourhood centres for local lifestyles 193

Establishing energy-efficient patterns beyond 1992 196

D. Impact on urban planning 198

LIST OF DIAGRAMS

No.	Title	Page
1	Programme of work and liaisons................ (Flow Chart 1)	9
2	Accessibility zones to Downtown Ottawa........	37
3	Conservation Pipeline publicity on the 'Household Survey of Trips and Energy Use'....	43
4	Map of sample areas for the 'Ottawa Energy Budgets Game'................................	94
5	Conserver lifestyle;: 1982 travel pattern....	112
6	Frivolous lifestyle: 1983 travel pattern.....	113
7	Conserver lifestyle: 1992 travel pattern.....	116
8	Frivolous lifestyles: 1992 travel pattern....	117
9	Contrast between Conserver and frivolous travel patterns...............................	118
10	Key Diagram for linkage interpretation........	121
11	Current (1982) journey-to-work................	122
12	Current (1982) night-out trips................	125
13	Current (1982) multi-purpose trips............	126
14	Entertainment and recreation trips............	127
15	Convenient multi-purpose trips in various parts of the City....................	129
16	Multi-purpose trips as simulated by 6 inner-suburb conserver groups..............	132
17	Occasional trips as simulated by 6 outer-suburb frivolous groups..............	133
18	Simulated multi-purpose trips in an inner-suburb neighbourhood...................	155
19	District Centre in an inner suburban area, as suggested by multi-purpose trips.....	157

No.	Title	Page
20	Downtown complex suggested by simulated multi-purpose trips	159
21	Specialist Centre - University - in the light of current multi-purpose trips	163
22	City District silhouette	165
23	Solutions for the clustering of linked activities	169
24	Possible District Centre locations by 1992	171
25	Urban form	173
26	Land use summary: downtown Ottawa	177
27	Land uses in Dalhousie business area	181
28	Land uses in Glebe and Ottawa South business areas	183
29	Land uses in Billings business area	187
30	Networking for local community centre expansion	195

LIST OF TABLES

No.	Title	Page
1	Comparison of Control Sample and Large Sample in the key statistics, 1982......	51
2	Principal Components Analysis of Household trips, Energy Use and Socio-economic variables, 1982................	55
3	Principal Components Analysis of Energy use and Socio-economic variables, 1982..............................	57
4	Principal Components Analysis of Household trips and Socio-economic variables, 1982..............................	59
5	Factor Analysis of Household trips, 1982......	60
6	The most significant groups of Household trip variables, 1982..........................	62
7	The most significant groups of Socio-economic variables, 1982......................	63
8	The most significant groups of Energy use variables, 1982..........................	64
9	Identification of Ottawa lifestyles, 1982 by reference to Household size, Residential location and Energy use...........	67
10	Hypothesized clusters of facilities...........	76
11	Summary of projections for the Ottawa Region at the Symposium (1982-1992)...........	81
12	1981 Household structure of the City, compared with the structure of households responding to the Ottawa Energy Budgets Game, 1983..................................	97
13	Transport mode options selected by respondents during the Ottawa Energy Budgets game, 1982-1992.......................	106
14	Ranking of the most popular destinations by annual car kmileage in 1982................	108

No.	Title	Page
15	Inventions offered to respondents during the Energy Budgets Game, 1982-1992............	110
16	1982 Ottawa lifestyles in relation to energy use..................................	136
17	Summary of average characteristics of Ottawa lifestyle groups, 1982-1992............	138
18	1992 Ottawa lifestyles in relation to energy use..................................	142
19	Local clusters of facilities..................	156
20	District centres for various communities......	158
21	Optional facilities in a downtown complex.....	158
22	Ranking of urban facilities by frequency of interactions...............................	160
23	Existing land uses in Ottawa CBD.............	176
24	Existing land uses in Dalhousie business area..	180
25	Existing land uses in Capital Ward business area...............................	182
26	Existing land uses in Billings Bridge business area..	186

ENERGY USE AND LAND-USE PATTERNS IN THE CITY

Executive Summary

OBJECTIVE

The principal objective of this study was to consider the availability of energy over the decade 1982-1992 and its probable impact on lifestyles in the City of Ottawa, in order to formulate energy efficient patterns of land use. These patterns would provide guidance for Official Plan preparation.

METHODOLOGY

The methodology is based on a lifestyles approach to planning, which aims to establish current and foreseeable patterns of energy use and household trip to various facilities in a city and subsequently re-arrange land uses in clusters suggested by statistically significant numbers of people, representing all walks of life in that city. These clusters should extend the scope for multi-purpose trips by a household, in order to minimize car travel.

Current (1982) patterns of energy use and household trip in Ottawa were established by questionnaire, delivered to some 2,000 households in 100 city blocks, evenly distributed over 3 accessibility zones to downtown. Foreseeable (1992) patterns of energy use and household trip were established by questionnaire survey followed by a simulation game supervised by an interviewer, to record the household's choices in response to three scenaria covering the periods 1982-1985; 1986-1988; and 1989-1992. These scenaria were formulated through a symposium of 12 specialists from government and private industry in the Ottawa region, each making projections in his field and reacting to others in the group.

During the simulation game, each scenario required a participating household to make choices between various alternatives - in travel mode, frequency of activity, multi-purpose trip, forthcoming inventions and other means to help reduce the consumption of energy, in relation to their 1982 budget of miles and disposable income. The sample of 500 randomly selected households in three wards of the city extending from downtown to the suburbs was supplemented with voluntary responses solicited by the announcement shown on the cover of this volume.

RESULTS

A Typology of Lifestyles

Principal Components and Factor Analysis of the data collected from the first survey, identified certain destinations, energy use and socio-economic characteristics of households, as underlying the distinction between energy frivolous and conserver lifestyles in Ottawa.

The former had a distant cottage, lived far from the husband's workplace and from shopping centres, restaurants, movies and other frequently visited facilities. They also had many members in the household, spent a lot on gasoline and heating oil and their prosperity depended on the occupation, education and age of the principal member of the household. Their lifestyle was most vulnerable, however, because the income per household member was not high.

Conserver households on the other hand, visited facilities in 'round trips', used natural gas, electricity or solar heating, had two highly educated principal members to head the household and spent a lot on public transport. These diametrically opposed attitudes in the use of energy, together with household size and residential location were adopted as a basis for the classification of all Ottawa lifestyles into 36 relevant types, for purposes of further analysis and projection of change to 1992.

Key Urban Activities

The calibration of results from the first survey by the use of Principal Components and Factor Analysis helped to distinguish between the important and less important elements in energy conservation. This could be used to priorize municipal actions - particularly in community outreach - in order to concentrate effort and expenditure on the most effective measures. For example, the ranking of 21 most popular destinations in Ottawa lifestyles by annual mileage of car travel caused to survey respondents, indicated that six activities - commuting to work, shopping, going to restaurants, to the cottage, social visiting and movie going, caused nearly 80% of the total travel to these 21 destinations. Land use planning could be focused on key activities to help reduce travel with maximum effect, before dealing with secondary activities.

Key Factors in Energy Planning

By the same token, there is a set of key factors revealed by this study, which if considered in priority order during Official Plan preparation, could produce a balanced and constructive input to the urban planning process. This set of key factors would be as follows:

1. Energy availability for the foreseeable future;
2. Foreseeable patterns of energy use;
3. Foreseeable travel patterns;
4. Foreseeable lifestyle changes;
5. Land-use patterns to serve lifestyles.

Each of these may generate a hypothesis and the consideration of alternatives in all five, may lead to the formulation of scenarios for the foreseeable future. The analysis of travel patterns to various facilities for example - by mode of transport, frequency of visits, demand cone, common hours of operation of facilities and other correlations - led to the formulation of a hypothesis, which paired facilities similar in all the above-mentioned aspects, as a first step towards the formulation of clusters of mixed land use, to extend the scope for multi-purpose trips in the City.

Energy Availability: 1982-1992

The current stable prices for oil appear to be only temporary and by the end of the decade, all energy resources could be expected to become increasingly expensive. This will mean high maintenance costs for buildings, high rental levels and property values and greater emphasis on renovation than new construction in outward ripples from the Inner-City. The continual rehabilitation of existing public and private house stock will call for the development of a labour-intensive, science-based and computer-oriented renovation technology with growing reliance on renewable energies.

Foreseeable Patterns of Energy Use: 1982-1992

In view of the growing shortage of energy during the study decade, there will be a continual diversification from fossil fuels to renewable, dependable and local energies. Passive and active solar will progressively lead to affordable photovoltaics and the abundant generation of low-intensity electricity and hydrogen. These and other highly flexible forms of renewable energy will be used for a great variety of purposes from cooking, through heating, to transportation. Even manpower will be relied upon in this diversification effort, but the greatest contribution may be expected from the computer. Telecommuting for example - working at home by reliance on two-way computer terminal - could drastically reduce energy needs in the future.

Foreseeable Travel Patterns: 1982-1992

The challenge of overcoming the mounting price of gasoline after 1985 was met in a variety of ways by the respondents. The private car - whether converted to run by propane, electricity or hydrogen - continued to be a popular means of transport for selective trips, which by virtue of distance, weather or time, could not be substituted by some other mode. Many believers in the conserver ethic, proved particularly resilient however, opting to diversify and rationalize the modes used on every occasion, by resorting to multi-purpose trips, bicycle or tricycle, transit bus, telecommunication, or even skating to reduce the impact of gasoline price hikes. On the other hand, no respondent would sell his cottage - one of the most demanding facilities in car travel - no matter how expensive energy were to become, preferring instead to reduce the frequency of visits. The receptiveness to new inventions offering scope for energy conservation or trip elimination was an important difference between well-educated 'conserver' respondents and others. Their multi-purpose trips were also better planned, longer and more varied in number and scope.

The most frequently employed substitutes to the car for the journey-to-work were rapid transit, the car-pool and the bicycle - in favourable weather. Telecommuting offered the scope of a virtual elimination of this journey and 44% of the respondents indicated willingness to adopt it, while a further 23% would leave the decision to their employer. Peak-hour traffic may therefore be substantially reduced with telecommuting, but its adoption depends on many other factors. As far as travel patterns are concerned, the need for energy-efficient patterns of land use will always be pressing, because it will help to minimize destinations in the city. Evening and night peaks may become more serious, as they gather momentum, to cater for increased entertainment and cultural outings. Teleshopping - the use of videotext for the selection of goods for home delivery - was popular among respondents for the purchase of non-durable goods from district warehouse stores. Quality and convenience goods were thus the only purchases left for shopping expeditions and the former were expected to be found at regional centres, while the latter should be available at walking or at least cycling distance. Weekend traffic patterns are likely to continue with the dominance of day trips, picnic outings and cottage visits.

Foreseeable Lifestyle Changes: 1982-1992

A comparison of socio-economic characteristics and of the choices made by households during the simulation game helped to establish possible trends in lifestyle change between 1982 and 1992 and its implications for energy consumption and travel behaviour to social and economic opportunities.

A continual, though diminishing trend over the study period was the decrease in household size and the changing occupational structure of a declining work force. Several large homes in the survey were found to accommodate two or more households of widely varying lifestyles - e.g., aging parents + the young family of a sibling + bachelors in rented accommodation. An important difference between the lifestyles discerned in 1982 and 1992 was the increase of 'conservers' from 55% to 72% and the development of 'resilient conservers' as a growing sub-group among them. The additional criteria on which the 11% of 'resilient conservers' were discerned were:

a. Receptiveness to energy-related inventions;

b. Choice of transport mode being related to energy, rather than income or prestige considerations;

c. Multi-purpose trips involving longer chains of activities;

d. Perseverence in trying to stay within the annual mileage limit for a period of the simulation game.

e. Ability to benefit from financial incentives for home renovation.

TELIDON was the most popular among the foreseeable inventions included in the simulation game and it was followed by the Solar Collector and the Electric Car. Home Medical Care by TV, Hydrogen conversion of cars and the Tricycle followed closely, helping respondents of various lifestyle groups - 'resilient conservers' in particular - to save energy, preserve a healthy variety of activities and their standard of living. In this connection, some 'frivolous' groups proved most vulnerable, because they were least receptive to innovation and they found themselves increasingly restricted to television at home. The need to 'purchase' inventions to satisfy traditional needs like shopping, meeting, learning, information, entertainment and culture was most frequently expressed by the educated and upper income respondents. The chance to improve one's skills and education by reliance on a videotext terminal at home was welcome to the majority of the respondents.

The most significant trend over the study decade could be the localization of employment at home, through the growth of home occupations and the acquisition of novel means of telecommunication to avail oneself of the expected growth in services and informatics. The longer time spent at home, meant taking better care of it, renovating, re-decorating, retrofitting, extending and generally improving it as a workplace, as well as for social visiting and purely residential purposes. As a reaction to the isolation felt by spending more time at home, it appears that leisure time will increasingly tend to be devoted to face-to-face contact, physical recreation, entertainment, festivals, spectacles, cultural activity and quality shopping. Although most of these will be possible to enjoy through TV or video, it will be the sense of occasion and the need for change, exercise and fresh air that will motivate most outings. Social visiting will be only partly replaced by videophone or long distance calls to distant friends or relations, for example. Close friendships, according to this survey, will always require and thrive on face-to-face meetings.

Foreseeable Land-Use Changes: 1982-1992

The interpretation of lifestyle changes into land-use patterns was based partly on consideration of the above-mentioned trends, but also on the interrelationship of activities indicated by respondents at three levels of supposition: (i) Multi-purpose 'round trips' to various facilities, as currently carried out, to save energy, time and money; (ii) Pairs of activities which would be convenient to carry out one after the other; and (iii) Proposed 'round trips' as a way of saving energy, in the course of the simulation game itself. Frequency counts of these three indications for the entire sample, as well as for specific lifestyle groups, resulted in the formulation of various clusters which suggest three levels of distribution of facilities: -

a. Locally accessible clusters or isolated facilities within walking or cycling distance, serving people of a particular lifestyle, resident in the immediate vicinity;

b. Community and district centres of a variable size and composition, serving a population between 15,000 and 60,000 according to content of specialized facilities and geographical location on the transport network, to serve a community with particular socio-economic characteristics in the inner or outer suburbs of the City, as well as people attracted from other communities;

c. A large downtown complex of facilities serving the inner city for basic service needs and the entire city and region for specialized needs. Indirectly, this centre would also disseminate innovations and generate continual change in lifestyles.

The transport network for accessibility to these centres would be largely as existing, but major intersections with the Transitway will assume greater significance to serve as nodes for the location of new, or the enlargement of existing community centres. Centres on this route will tend to become specialized office and high technology manufacturing locations, attracting employment of particular skills from all parts of the City and the surrounding region. Service facilities for the daytime as well as resident population of these district centres will tend to grow around the transit stop and the gradient for the intensity of activities as well as the density and height of buildings around these stops will tend to assume a distance-decay curve in general.

The density of housing will tend to decrease beyond the vicinity of a district centre and it appears that quality housing in low density pockets in inner and outer suburbs will always be in demand. Home occupations related to tertiary (service) and quaternary (informatics) employment will grow substantially in all residential areas.

Retail facilities will be at the heart of the distribution of facilities indicated in (a), (b) and (c) above, with downtown stores offering quality and durable goods, regional centres providing mostly durables and district centre stores undertaking large scale home delivery services in response to videophone orders. The local convenience store will consist of a variety of vending machines, as well as a perishable goods counter, the former being accessible 24-hours a day, the latter for most of the daytime and after-work evening hours.

Educational activity will continue to be institution-based at primary and secondary levels, but shift considerably to a home base - linked by videotext to college, university, research institution or public data centre - at higher education levels. Some parents will expect their more numerate and computer-oriented off-springs to teach them about the latest electronic gadgetry and robotics before purchase or use. Life-long continuing education will increasingly become the accepted way to adjust to new technology and consequent economic and social developments.

Entertainment, cultural and recreational facilities will be located at district centres to be accessible by Transitway, but will increasingly have to rely on spectacular events to attract audiences away from video substitutes at home, by offering people a sense of occasion. Recreational facilities in the residential environment will be either dispersed or located in small clusters of flexible multi-purpose spaces designed to accommodate a wide range of social, entertainment as well as recreational activities. This will be the case also with regional facilities of a unique character, offering day-long recreation or nature interpretation outings to visitors from surrounding cities and regions.

Employment centres will consist of office concentrations around transit stops in the vicinity of main road and highway intersections on one hand and industrial parks near bus stops and highway intersections on the other. Each employment centre should be planned to accommodate a specialist centre of production - computer software or hardware, automation components, consumer products, etc. - concentrating several interrelated manufacturing and service activities, including shopping, recreational and other provision for the varied needs of the workforce.

The most suitable urban form in an era of uncertainty on energy resources would be the linear city, based on private and public transportation spines, to be expandable on either side, but restricted in lateral sprawl with a designated green belt. Each specialized district centre along the public transit spine would offer the widest scope for multi-purpose trips for a particular function like shopping or entertainment - to maximize convenience as well as energy efficiency. The downtown core would contain clusters of highly specialized and subsidiary activities - concert hall, specialist shops, gourmet restaurants and government functions - which most people would visit on occasion.

Comparison with existing patterns of land use

The comparison of zoned land uses, as existing in most cities today, with the clusters which are based on the linkage suggested by statistically significant multi-purpose trips, indicates a deep-rooted contrast. Economic protectionism, clinical segregation of land uses and separation of public and commercial developments, which prevented, say, a clinic or library from locating next to a supermarket in the past, could not allow for convenience - let alone energy efficiency - today or tomorrow. Private development agreements to allow municipalities to complement existing commercial urban, district and other centres with social, medical, cultural, entertainment and educational facilities, should therefore be developed, in order to extend the scope for multi-purpose trips by the consumer, for the sake of convenience and efficiency.

Impact on Urban Planning

Preparation to respond to such an extensive number of foreseeable changes in society within a decade, implies the need for some fundamental change in attitude, methodology and education for the profession. Alternatives to land use zoning have to be explored and reliable projection methods to anticipate social and economic needs have to be developed, in order to allow planners to take timely and appropriate action in the face of rapid change. The conflict inherent in siding with disadvantaged minorities and seeking to improve vulnerable lifestyles for an energy-starved future is likely to make the political nature of planning increasingly more evident to the citizen. Armed with TELIDON and the televote, he or she will have wider access to public information, will be more eager and willing to participate in planning from the convenience of his or her home and will certainly be more anxious to cast the vote of approval or disapproval. The trend towards pluralism in an anticipatory democracy is likely to call for different plans to suit different clans - i.e., special facilities, housing, densities and environment in general, for special lifestyles.

In response to all these challenges, the planning process will have to be more social than technical; data collection will mean more social survey and networking with citizens, than isolated technical meetings and research; analysis will involve more thematic mapping by computer, than abstract painting with 'magic marker'; and the selection of final options will certainly call for more teleconferencing and televoting, than fiddling with option evaluation matrices.

In this decade of challenge, urban planners are likely to become more akin to social leaders, than to environmental scientists.

GA:jac-5
D2D051

INTRODUCTION

A Lifestyles Approach to the Planning of Land-Use Patterns for the Energy-Tight 1980's

Historically, land-use patterns, whether considered at the urban, rural or regional scales, have tended to reflect the social and economic concerns of society over time. Examples of this include the agricultural landscape dotted with market towns in feudal times and the workers' homes huddled around factories during the Industrial Revolution. In more recent times, the abundance of oil at an incredible $1.00 a barrel until 1973 could be said to have contributed to the establishment of out-of-town shopping centres.

Naturally, this relationship between society, economics and land-use patterns is continuously changing and there is always a certain time lag between social and economic concerns on one hand and their reflection in terms of land-use patterns on the other. The latter tend to be less flexible and together with the buildings and equipment - the shelters and machinery we use to locate and facilitate our activities - they may be referred to as the "hardware" of an economy. By contrast, the social and economic concerns or motivations of people and the activities they give rise to, may be referred to as the "software".

If the time lag between the "software" and the "hardware" in any economy could be reduced to a minimum through the continual relocation and renovation of buildings and equipment, then people would find their environment very convenient. All journeys would tend to be short, all homes would be comfortable and all machinery very efficient. The consumption of energy would be very low in such an environment of high accessibility and updated equipment, but it would still be a need, because energy is an implicit requirement of every social and economic activity.

The social and economic activities carried out by a person or household in order to satisfy social and economic needs, together with the movement they generate may be said to constitute a LIFESTYLE. Energy is an essential component of every lifestyle and a sudden change in its availability could have dire repercussions on that lifestyle. Given this close relationship between energy and lifestyles the following questions arise:-

1. In what ways does the scarcity of energy affect a given lifestyle?

2. Could energy availability provide a key between present and foreseeable lifestyles?

3. How could energy restrictions on a lifestyle be reflected in a planned pattern of land uses?

These questions stress the current and foreseeable concerns of urban and regional planning. At one time, planners used to concern themselves with the issues arising from "place-work-and-folk". Today, it is perhaps time to revise this to "lifestyles-energy-and-environment".

OPTIONS

There are two major approaches that planners might follow in attempting to change the built environment in order to bring about a correspondence between social and economic concerns on one hand and land-use patterns on the other:-

a. They could determine how the environment should be changed and proceed to persuade public and private enterprise to finance massive rebuilding. This deterministic "attack on the hardware" is likely to require considerable social and economic sacrifice, because of the disruption and upheaval implicit in this approach;

b. Affect change "through the software" - i.e. through the current and foreseeable lifestyles, under the influence of prevailing social and economic trends - particularly the scarcity of energy. This would mean change in a piecemeal fashion that would not violently upset the social and economic fabric of society and the normal process of development.

History may provide examples of sudden or gradual change in social and economic trends, but their reflection on land-use patterns has always tended to be slow and piecemeal. Moreover, the habitat or 'shell' provided by an existing environment has always tended to influence the development of lifestyles, which in turn affect the development of the habitat itself. This cyclical chicken-and-egg puzzle may be resolved only by giving priority to one of the factors, through deliberate choice, under the influence of prevailing mores and values.

If we respect people and their present values, the choice can only be 'lifestyles' - i.e. the software, in preference to the hardware.

OBJECTIVES

The approach to be followed in this project will be based on a study of current and foreseeable lifestyles in Ottawa, to derive guidelines for the gradual change of the built environment towards land-use patterns which may serve a foreseeable high-tech society without causing any wastage of energy resources. The fundamental premise is that before tampering with the existing hardware - the environment as we know it - a thorough understanding must be developed of the software - the present and foreseeable lifestyles - together with a recognition that the existing environment and energy concerns are likely to influence the development of future lifestyles in the area.

This approach implies a planning system with the following principal features:-

(i) A definition of lifestyle which is relevant to this approach;

(ii) Surveys of current and foreseeable lifestyles and their relationship to energy availability;

(iii) An analysis of current and foreseeable lifestyle differences and implications;

(iv) A formulation of the land-use patterns to serve foreseeable lifestyles;

(v) An involvement of citizens in all stages of this process, in which personal values and decisions are likely to be involved - i.e., (ii) and (iv) above.

The detail objectives and a description of the methodology will be found in the remaining pages of this Introduction.

TERMS OF REFERENCE

The goals and objectives of this project, in accordance with the City's application for an Energy Conservation Through Land-Use Planning grant to the Ontario Ministries of Energy and of Municipal Affairs and Housing may be stated as follows:-

GOAL:

Identify the difference between existing and energy-efficient patterns of land-use, to provide guidance for Official Plan amendment from the scale of the local community to that of the City as a whole.

OBJECTIVES:

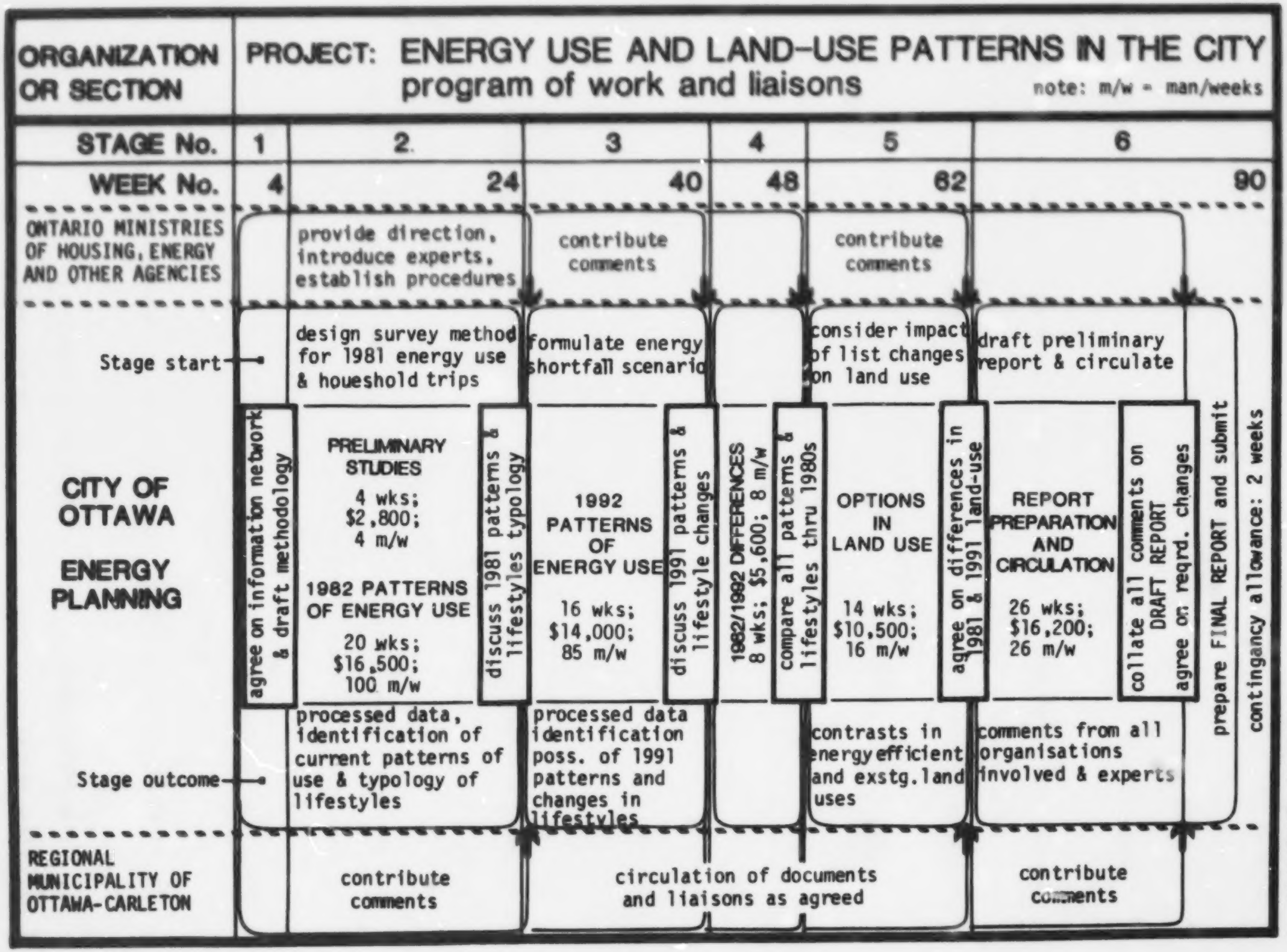
i. To establish current (1982) and possible 1992 patterns of energy use and household trip to social and economic opportunity;

ii. To formulate more energy-efficient patterns of land use in the City, in order to serve possible 1992 lifestyles;

iii. To identify differences between existing and energy-efficient land-use patterns.

PROGRAMME

The research was carried out over a period of twenty-one (21) months from February 1982, to October 1983, inclusive in accordance with Flow Chart 1.


ORGANIZATION OR SECTION
PROJECT: ENERGY USE AND LAND-USE PATTERNS IN THE CITY
program of work and liaisons
note: m/w = man/weeks
STAGE No.
1
2.
3
4
5
6
WEEK No.
4
24
40
48
62
90
ONTARIO MINISTRIES OF HOUSING, ENERGY AND OTHER AGENCIES
provide direction, introduce experts, establish procedures
contribute comments
contribute comments
Stage start
CITY OF OTTAWA
ENERGY PLANNING
Stage outcome
agree on information network & draft methodology
design survey method for 1981 energy use & houshold trips
PRELIMINARY STUDIES
4 wks; $2,800; 4 m/w
1982 PATTERNS OF ENERGY USE
20 wks; $16,500; 100 m/w
processed data, identification of current patterns of use & typology of lifestyles
discuss 1981 patterns & lifestyles typology
formulate energy shortfall scenario
1992 PATTERNS OF ENERGY USE
16 wks; $14,000; 85 m/w
processed data identification poss. of 1991 patterns and changes in lifestyles
discuss 1991 patterns & lifestyle changes
1982/1992 DIFFERENCES
8 wks; $5,600; 8 m/w
compare all patterns & lifestyles thru 1980s
consider impact of list changes on land use
OPTIONS IN LAND USE
14 wks; $10,500; 16 m/w
contrasts in energy efficient and exstg. land uses
agree on differences in 1981 & 1991 land-use
draft preliminary report & circulate
REPORT PREPARATION AND CIRCULATION
26 wks; $16,200; 26 m/w
comments from all organisations involved & experts
collate all comments on DRAFT REPORT
agree on reqrd. changes
prepare FINAL REPORT and submit
contingancy allowance: 2 weeks
REGIONAL MUNICIPALITY OF OTTAWA-CARLETON
contribute comments
circulation of documents and liaisons as agreed
contribute comments

FLOW CHART 1

DEFINITION OF KEY TERMS

"HOUSEHOLD TRIP"

A return trip from home to any destination, by any mode of transport, undertaken by one or several members of a household at a time, to take part in social and economic activities - shopping, education, employment and so forth.

"LIFESTYLE"

The sum total of household trips over the space of a year, indicating a pattern of energy use by a household and relating to their social and economic needs.

"ENERGY USE"

The sum total of renewable and non-renewable energies expended by a household in and around their home, in carrying out all essential social and economic activites.

The definition of other terms established in the course of this research will be given as the terms occur in the text.

REPORT ON THE PROJECT

The final report on the project consists of the following volumes:

1. FINAL REPORT SUMMARY
2. FINAL REPORT
3. APPENDICES
4. SYMPOSIUM

METHODOLOGY

The three objectives of this project - as indicated under the Terms of Reference - have been pursued through the combination of a series of methods which may be summarized as follows:-

1. Investigate sources of comparable research and information and prepare an annotated bibliography on the subject. (See APPENDICES)

2. Survey of household trips and energy use in 1982 involving some 2000 households living in the City, to establish current patterns in the use of energy and various facilities or land uses. A comparison of households on the basis of these patterns, correlated with socio-economic and locational data on residence and workplace, helped to identify the prevailing typology of lifestyles in the City.

3. Game simulation of household trips in four situations of progressively restrictive energy scenaria. Each scenario required a participating household to make choices (with the aid of a calculator) between alternatives - in travel mode, frequency of activity, multi-purpose trip and other factors affecting energy, in relation to their current (1982) budget of miles and energy in general.

4. A comparison of these choices with 1982 patterns of energy use and household trip helped to establish some trends in lifestyle change to 1992.

5. Foreseeable lifestyle changes and multi-purpose trips indicated by 1 and 2 above, were now considered to provide guidance for the rearrangement of land uses, towards more energy-efficient patterns. Choices which proved most popular with various types of respondent will be taken to provide clues for planning various areas and types of centres for greater energy efficiency.

6. Diagrams were produced to suggest various intensities of "linkage" - pedestrian and other mode journeys by people from one land use to another, in the course of multi-purpose trips. Each linkage intensity was subsequently considered to provide clues as to the type of physical link required between two facilities or land uses, to extend social convenience, to further the scope for multi-purpose trips and to help avoid the use of the motor car as far as possible. Current physical links may include spatial proximity, public transport, bikeway or footpath, while future links may include telecommunication, television and computer terminals.

7. The identification of differences between existing and energy-efficient land use patterns was a simple process of comparison to establish patterns which were compatible with the findings of this project.

GA:baw-5

A2D034

SECTION 1

BRIEF SUMMARY OF LITERATURE

Literature on energy-efficient planning has been growing by leaps and bounds in recent years. It is important to establish the source of fundamental concepts underlying a piece of research, but in view of the phenomenal growth of literature on the subject, it is even more important to identify a gap in existing research, into which the proposal may fit. The purpose of this section of the report is to establish the extent to which current literature on each objective of the project provides coverage and allows scope for novel research. By taking stock of what has already been covered in a particular area of interest, it is hoped to establish the gap in knowledge which may be usefully pursued as a research objective.

The areas of interest which are encompassed by the 3 objectives of this project may be listed as follows: -

OBJECTIVE (i) - ESTABLISH PATTERNS OF ENERGY USE AND HOUSEHOLD TRIP

Areas of interest:-

1. Patterns of energy use by households - current (1982) and possible by 1992.
2. Household trips to social and economic opportunities.

3. Trends in energy use and availability between 1982 and 1992.
4. Change in social trends between 1982 and 1992 likely to effect patterns of energy use and household trip.
5. Methods of forecasting 3 and 4 above.

OBJECTIVE (ii) - FORMULATE ENERGY - EFFICIENT PATTERNS OF LAND USE

Areas of interest:-

6. Energy-efficient patterns of land-use.
7. Land-use in the service of lifestyles.
8. Lifestyles and the need for energy.
9. Multi-purpose trips by households.
10. The flow of people between facilities in the city, as a form of linkage necessitating spatial proximity between them.

OBJECTIVE (iii) - IDENTIFY DIFFERENCES BETWEEN EXISTING AND ENERGY-EFFICIENT LAND USE PATTERNS

Areas of interest:-

11. Critiques on current zoning policies.
12. Energy-efficiency criteria for land-use patterns.

These 12 areas of interest were communicated to the Intergovernmental Committee on Urban and Regional Research (ICURR) with a request for a search into references and information sources on them. Although hundreds of books and articles were indicated, the perusal of the actual material indicated only about 30 relevant works. These appear in the annotated bibliography in the APPENDICES volume, together with several other references to guide the interested reader.

The conclusions reached through this investigation may be summarized as follows:

1. PATTERNS OF ENERGY USE BY HOUSEHOLDS

It has been observed that in post-war years, an increase in income has led to the acquisition of household appliances and equipment, leading to a corresponding increase in the use of energy. Hannon (1978) reports that each additional dollar of income, demands nearly the same outlay for the purchase of additional energy. This may have been true in the case of an acquisitive society before 1973, but it obviously has to change now.

2. HOUSEHOLD TRIPS TO SOCIAL AND ECONOMIC OPPORTUNITIES

Studies in travel behaviour in USA, under the constraints of an energy shortfall, indicate that at least 50% of working people took some action to save energy on their journey to work - i.e., car-pooling, walking, cycling and driving slowly. The shift to smaller cars has helped to decrease consumption considerably, otherwise there was little elasticity in the demand for gasoline. The scarcity of energy appears to effect adversely those with the fewest choices in travel - i.e., rural, low-income and no-car families.

The most hopeful sign is that the younger age groups are more willing to adopt a conserver lifestyle.

3. TRENDS IN ENERGY USE AND AVAILABILITY BETWEEN 1982 AND 1992

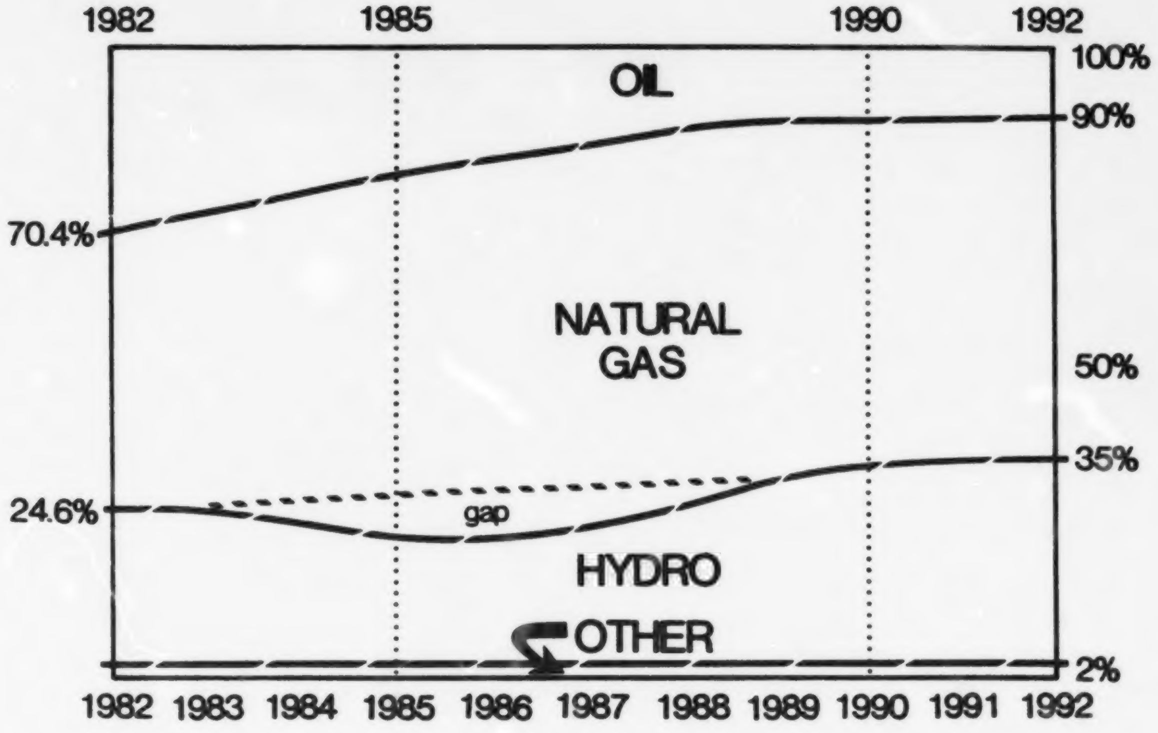
A. OIL

Current Prices

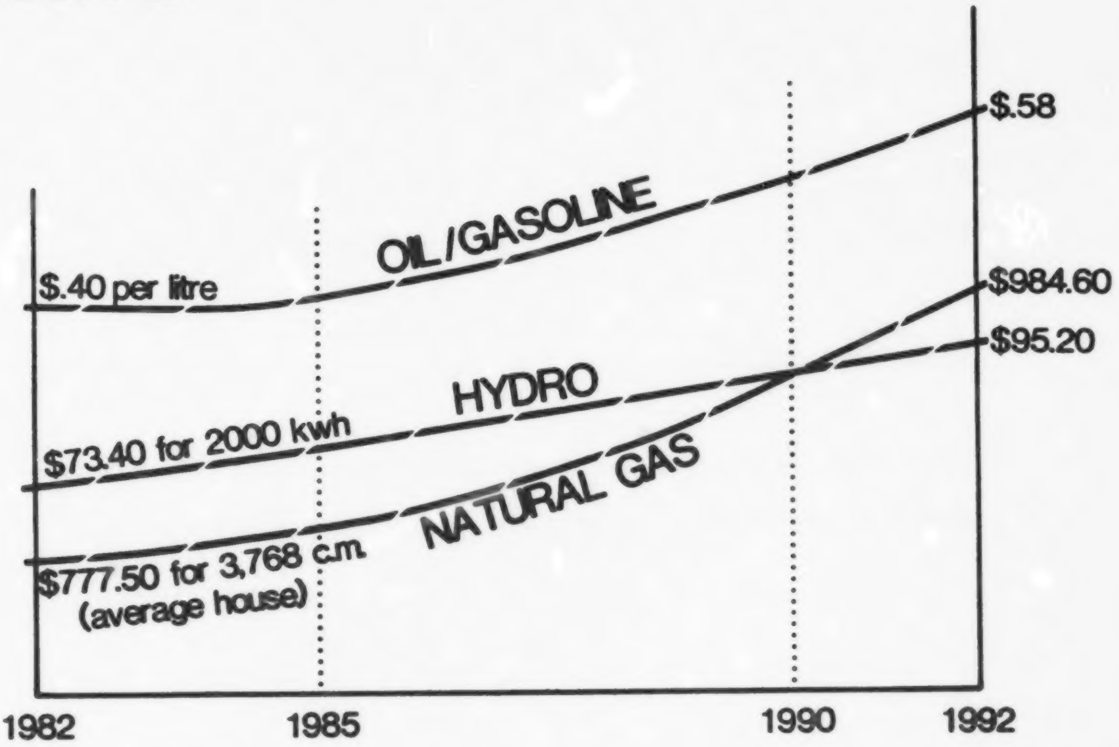
1. (i) Saudi oil: $39.00 per barrel
   (ii) Venezuela: $36.00-$37.00 per barrel

2. (i) Canadian new oil: $36.00-$37.00 per barrel
   (ii) Canadian old oil: $27.00 per barrel

In 1983, with all conservation efforts, Canada has to import 50% of the total need of 1.6 million barrels per day - i.e., 800,000 barrels ber day. With continued conservation to 2000 AD, the total need may rise to only 1.9 million



SUPPLY



PRICE

PROJECTED GASOLINE PRICES: 1982-1992

(Assuming that December 1982 price = 100)

Year	Price	Year	Price
December 1982	100	1988	169
1983	110	1989	185
1984	119	1990	202
1985	128	1991	218
1986	140	1992	237
1987	154		

Source: Original figures on which these percentages are based were produced by the Ministry of Energy.

Transportation

About 22% of the increase of 60% by 2000 is expected to be in the demand for gasoline to be used for transportation.

Options for Canada

Current reserves could last 8-9 years if no oil were to be imported. Depletion of old oil is continuing by 100,000 barrels per day.

Two possibilities are open:

(i) PRODUCE MORE TO BECOME SELF-SUFFICIENT

- through conservation and conversion (of vehicles as well as heating plants);
- through full exploitation of tar sands, frontier, conventional (old) and heavy oil and by the use of enhanced recovery technology. But this must continue regardless of temporary iol 'glutts' or world price fluctuations, in order to make Canada self-sufficient by 1990.

(ii) IMPORT WHENEVER IT PAYS TO DO SO

- This would allow for world price fluctuations to help increase the reserves. It will, however, keep Canada dependent on imports beyond 1990.

Conclusions

1. Total demand will increase especially in transportation.

2. Supply is continually decreasing from domestic sources.

3. Canada could become self-sufficent...with a struggle.

4. New supplies are difficult to exploit because world price fluctuations may suddenly make such exploitation no longer profitable. Money is automatically diverted by investors.

5. An increase in price is expected by 1985. By 1995 the increase in price will stabilize at 2% per annum plus government taxes.

6. There is a 5-10 year time lag between the discovery of a new source (e.g., Hibernia) and the actual use of oil from that source.

7. Our national policy to become self-sufficent in oil by 1990 is undermined by occasional gluts in world markets.

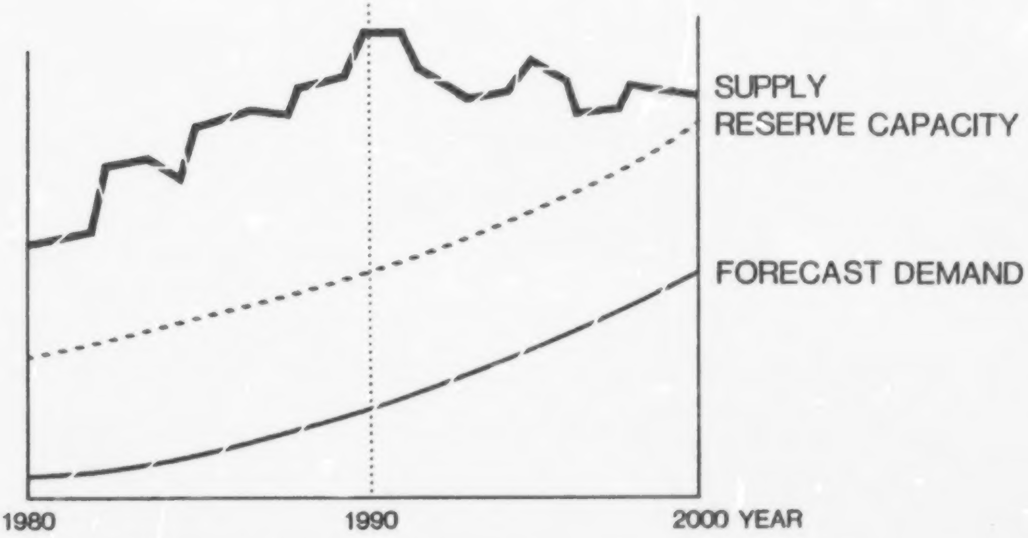
B. ELECTRICITY (Source: Mitch Rothman, Economist, Ontario Hydro)

Basic Facts

- Installations of new supply come "in lumps".

- Demand grows continuously to the year 2000.
- The expected growth of demand is 2% per annum.

- The debt accumulated by the construction of new installations will push up the price of electricity even though supplies will be plentiful to the year 2000.

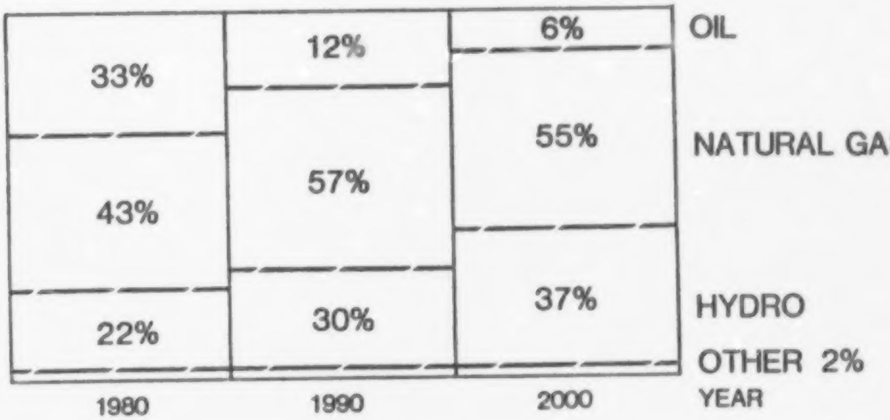


HYDRO DEMAND & SUPPLY

- Electricity will become cheaper than gas by 1990.

- A dual heating system based on gas and portable electric heaters may be a solution.

- The price of gas will increase beyond the "65%-of-oil" level because demand for transportation (propane conversions) will increase.



FORECAST

C. NATURAL GAS (Source: Richard Walker, Senior Vice-President, Marketing, Trans-Canada Pipelines Limited)

Basic Facts

- Today, 53.7% of the gas produced is used for heating.

- No less than 60% of conversions from oil have been to gas.

- Lowest cost (in Ontario), clean, safe, efficient, abundant.

- Canada has more reserves than predicted. Some 10,000 wells have been shut down in Alberta because of lack of demand. Exploration has declined.

- The problem today is how to increase demand.

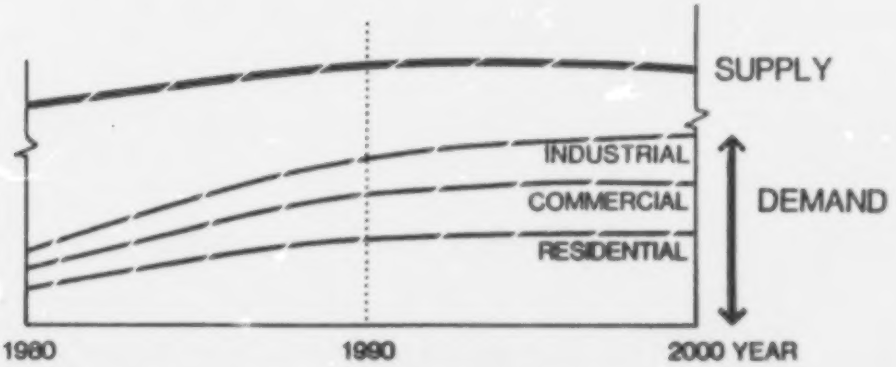
- The price of liquified natural gas (LNG) at 23.8¢ for transportation, could not be more competitive in relation to oil. Lifecycle costing indicates that a car is 33% cheaper if run on LNG.

- Natural gas is Canada's second best export.

- An estimated 17 trillion cubic feet are still available in Arctic regions.

- Gas will be plentiful for decades to come.

Forecast



NATURAL GAS FORECAST

Gas heating bills in Ontario have been reduced by 15% between 1975 and 1981.

4. CHANGE IN SOCIAL TRENDS BETWEEN 1982 AND 1992 LIKELY TO AFFECT PATTERNS OF ENERGY USE AND HOUSEHOLD TRIPS

References on this subject are practically non-existant. They appear to be limited to particular social classes - the affluent - and they hardly venture into the future, reflecting the difficulty of prediction in these times of uncertainty on oil and energy prices in general.

An estimate by Herendeen (1974) in an article titled AFFLUENCE AND ENERGY DEMAND, indicates that if only 10% of all commuters in USA diverted from the car to the bicycle, there would be a saving of 30 million barrels of oil per annum - worth $850 million in 1974 prices - and incalculable health benefits would also ensue.

5. METHODS OF FORECASTING TRENDS IN ENERGY USE AND IN SOCIAL CHANGE

This is another subject on which most references are mute. A study by Stucker (1976) titled THE IMPACT OF ENERGY PRICE INCREASES ON HOUSEHOLDS - AN ILLUSTRATION includes the following method:-

Divide household expenditure on energy into direct and indirect expenditure. The former are taken from household budget studies, while the latter are estimated by applying input-output coefficients to all expenditures other than energy. Assuming a percentage of the household income is allocated to energy expenditure, a subdivision is made into expenditures for coal, petroleum, electricity and natural gas. These permit an assessment of the impact of energy prices on each type of household, assuming no substitution among the above fuels. Naturally, lower incomes are more vulnerable to energy price hikes.

6. ENERGY-EFFICIENT PATTERNS OF LAND USE

There are several studies on energy conservation through land-use planning, but they are often based on an approach related to higher density, or more efficient subdivision of land, or zoning for solar access. Considering land-uses as a pattern of urban activity locations and attempting to rearrange them in ways to help people travel less was the approach followed by a study titled SERVICE FUNCTIONS AND URBAN CHARACTER and written as a PhD thesis by Armen in 1971.

In this study, activities forming a cluster were assumed to be linked to each other by virtue of their dependence on similar consumer and labour needs and above all by the flow of people and things material and abstract. These linkages are the prime reason for the proximate location of functionally interrelated activities (within sight or walking distance to each other) which extends the scope for multi-purpose trips by the consumer. These trips may be considered to be the essence of an energy-efficient urban environment.

The purposeful management of opportunities (i.e., planning) by private and public agencies can endow a city region with a cluster of interrelated clusters of activities brining a 'sense of place'. This is defined as a feeling that people, place and activities in a city region are related in a symbiotic manner and tuned to the operation of a special function towards the satisfaction of a particular human need - education, recreation, finance, etc.

The study is concluded with a computer programme to simulate the growth of a new community. Given a series of socio-economic and age groups, a coded description of site characteristics and the projeted hinterlands of neighbouring centres for various services, the programme will produce the following information for each stage of community growth:

(i) The full range of service activities for the consumer groups likely to be generated by the population.

(ii) The clusters which could be formed by these activities to maximize the scope for multi-purpose trips by consumers and the functional relationships required for the growth of these activities.

(iii) The matrix of distances between clustered activities to ensure visibility or walking distance between functionally interrelated ones, dependent on the flow of similar consumers from one to the other.

(iv) Prime-mover activities, which if established early in the programme of community building, will attract subsidiary activities and generate momentum for further growth.

(v) The service employment generated by each cluster of activities and the total by all services in the community

The context and standards of provision on which this study is based is England and Wales, but the approach to maximize the scope for multi-purpose trips for the convenience of consumers and for an energy-efficient urban environment could be applied to an society, because it is an extension of the principle of least effort.

7. LAND-USE IN THE SERVICE OF LIFESTYLES

All planning effort is intended to relate human and community needs in particular, to the use of land. The subdivision of a community into socio-economic or other groups has been viewed sometimes as a factor to be considered towards making each part of a city more responsive to the particular needs of these groups and in other times as an undesirable and politically biased approach to urban planning.

Regardless of these diametrically opposed views in the past, it is proposed to consider 'lifestyle' as a factor in the consumption of energy in this study and if findings justify a differentiation of lifestyle groups in planning the content and clustering of activities, to make this approach part of the methodology of energy-efficient planning.

No references were found to develop this approach towards the planning of energy-efficient communities.

8. LIFESTYLES AND THE NEED FOR ENERGY

Recognition of different lifestyles in a city implies an acknowledgement of their particular needs for energy. A study of the SOCIETAL AND POLITICAL IMPLICATIONS OF THE ENERGY CRISIS by Johnson (1974) was based on the interplay of 4 dominant factors to bring about a reduction in the energy used by various income groups in Virginia, USA:- Political control, technological breakthrough, economic allocation and sccial adaptation.

The resulting model for inferring the preferences of each income group considered was based on 24 scenarios combining the above factors and income levels and other variables.

9. MULTI-PURPOSE TRIPS BY HOUSEHOLDS

The first important study in this direction was carried out even before the energy crisis by Hemmens (1966). It was based on the assumption that different land-uses were linked by the flows of people visiting various facilities in succession through "multiple-leg" - i.e., multi-purpose - journeys.

After studying the results of a survey of origin - destination trips in three cities (Chicago, Pittsburgh and Buffalo) Hemmens was disappointed to find how few multi-purpose trips had taken place. Between 88% and 94% of all trips had "one or two destinations before returning home" while 75% of all trips in Chicago and Pittsburgh and 66% in Buffalo were simple round trips to a single activity. "In summary", he concludes, "the pattern of association among activities which we wished to examine is no pattern at all. It simply does not exist." The single, most likely, dual purpose journey in these three cities he found it to be from home to a retail facility, to another retail facility and back home. The second most likely was food, drugs and liquor; the third, convenience goods, personal services and wholesalers; the fourth, indoor recreation, eating and drinking; and lastly, auto sales, service and other wholesale. Any survey based on existing towns or cities, in which most activities have been haphazardly, located under the influence of finance and site availability to various developers (rather than the interaction of activities and the convenience of the consumer) is almost bound to lead to the disappointment expressed by Hemmens. His conclusion to the effect that there was little association or linkage among urban activities should not deter an effort to bring about such associations in future....The potential for convenient arrays of facilities to form functional clusters of activities and extend the scope for multi-purpose trips is always present and remains to be exploited. The problem is one of devising an appropriate methodology to solicit from people their suggestion for various combinations of activities, as a function of their daily, weekly and other cyclical needs.

A second important study titled CHANGES IN TRAVEL BEHAVIOUR DURING THE ENERGY CRISIS, 1973-74 was carried out by Keck in 1974, to investigate attitudes to gasoline rationing, driving bans, etc. It is not surprising that in the circumstances, the first finding was that households were reluctant to alter travel behaviour significantly. Demand for gasoline was higher for the males and tended to increase with age. The most significant finding from the point of view of this project was that multi-purpose trips tended to increase. This would be the basis for the development of a simulation game as part of a survey of possible lifestyle changes between 1982 and 1992.

A third study titled ENERGY SHORTAGE IMPACT STUDY was carried out for the US Travel Data Center (1974) concluded that weekend travel would be reduced for the coming year somewhat and concentrated closer to home. Most businessmen (80%) indicated that the shortage had little or no effect on their business travel. There was no significant change in the number of people planning vacations. There was, however, a drop in the proportion who said they use autos for their vacation (84% to 71%). There was no significant change in the preference for travel within vs. outside the United States. An increase in the price of gasoline to $1 per gallon would produce drastic cutbacks in vacation travel, while a 20% increase in air travel fares would not produce as dramatic a change.

10. THE FLOW OF PEOPLE BETWEEN FACILITIES IN THE CITY AS A FORM OF LINKAGE NECESSITATING SPATIAL PROXIMITY

(See Areas 6 and 9 above).

11. CRITIQUES ON CURRENT ZONING POLICIES

The most relevant study in this Area of Interest is Goldberg's 1980 study of ZONING: ITS COSTS AND RELEVANCE FOR THE 1980's. It starts by pointing out that Houston, Texas has never enacted zoning legislation, yet continues to grow and function with 1.6 m population. The market has created a "reasonably well-ordered pattern." The municipality co-operates with developers by forecasting growth patterns and supplying facilities and services "at the right time, size and place."

New York enacted the first zoning laws in America in 1916. They were intended as "police powers" to protect health, safety, convenience and public welfare. Today zoning has become a means of segregating land-uses.

Planned Unit Developments were developed to cope with the inflexibility of zoning. 'Performance zoning' accommodates mixed uses at various intensities. "Land-use contracts" in Alberta and B.C. make all land-use completely negotiable to arrive at a specific complex of uses.

The Zoning Debate

PROS: Zoning protects property values; it betters the 'public good'; preserves city character - areas of historical importance; zoning controls rapacious developers - civic bodies manage to shift some of the public costs onto private developments. Zoning ensures majority control of land-use.

CONS: It is based on a faulty premise that planning is a static end-concept of land-use control, while urban growth is dynamic. Zoning is inflexible - it takes six months to amend a zoning ordinace. It is becoming the tail that wags the planning dog - it dominates the entire planning function. It impedes progress by preserving the status quo, while the economics of the market place could counteract by redevelopment of decaying areas. Zoning creates legislative inequity. It lacks an automatic negative feedback mechanism. It causes corruption and monopolies.

Conclusion of Kerrisdale study in Vancouver: -

- A number of up-zonings led to decline in property values - greater density was disliked.

- Changes to supposedly incompatible uses - e.g. RS-1 next to RM-3 - led to increases in relative values.
- Rezoning promoted speculative activity.
- Inspection of adjacent areas 17 years after a zoning change showed no detriment.

12. ENERGY-EFFICIENCY CRITERIA FOR LAND-USE PATTERNS

Other than the obvious criterion of least energy expenditure in effecting linkages between land uses - see heading 6 above - no other criterion is mentioned in current literature on the subject.

A study on the criterion of city size in relation to energy use was carried out by Stewart and Bennett (1975) and published in LAND ECONOMICS. The objective was to examine the detriments of per capita expenditures for automobile transportation fuel and gasoline, with particular emphasis on the effects of city size and structure.

Analysis was restricted to 134 SMSAs with 1970 populations of 200,000 or greater. Data for retail sales of gasoline and lubricants were obtained from the 1967 Census of Business, while the population data were from the U.S. Bureau of Census.

Dependent variables were 'per-capita-retail-gasoline-sales,' while the independent ones were region, ethnicity, age, income-per-capita, use-of-public-transit, size, density, growth, price-of-gasoline.

The predictive power of the resulting regression model was generally low. SMSA size (-.0010) and rate of growth (-.0896) were found to be negatively related to per capita gasoline consumption, while the non-white proportion of the population was positively related to the per capita consumption (.1165). Age, income and price of gasoline were not significant in relation to per capita consumption. 'Regional location' was responsible for significant differences, as the west and north central regions were much higher than the northeast and south.

CONCLUSION

Few existing studies appear to be based on the approach discussed in the Introduction to this study and it is therefore concluded that a gap exists in existing research on the subject, as elaborated in the Areas of Interest shown in this section.

In Sections 2 and 3, in which the methodology of this study will be developed in detail, references will continue to be made to relevant studies, in order to ensure that duplication of effort is avoided and the work of pioneers in this field of research is respected.

GA:cse-3
D2D060

SECTION 2

1982 PATTERNS OF ENERGY USE AND HOUSEHOLD TRIP

A key concept in the approach to land-use planning put forward in the Introduction is the study of current and foreseeable lifestyles to derive guidelines for change in the built environment. In this section it is proposed to define "LIFESTYLE" in terms which are relevant to this approach to land-use planning and to set up a framework for a survey of current and foreseeable lifestyles.

ON LIFESTYLE AND ACTIVITIES

Lifestyle has been the subject of much sociological research and contention but its definition remains a matter of individual preference. Shevsky and Bell (1955) for example have derived an ecological typology of lifestyles on the basis of "differentiation among urban residents in the type of activities selected for work and leisure". Morris (1956) attempted to identify the "dimensions of preference in activity", while Chapin and Hightower (1966) suggested that "activity choice data could be used as an independent indication of lifestyles". The common theme of all these studies is the involvement of activities in a lifestyle. ACTIVITY has been defined as "an episode involving an expediture of effort for a particular purpose". The output may be a tangible product or an intagible service, instrumental in the satisfaction of some felt need of an individual or group (Chapin & Hightower, 1966). Every activity, whether related to work or leisure, requires some effort on the part of the participant, the sacrifice of some time and the expenditure of some renewable or non-renewable energy for access and return from the location of the activity. Watching TV at home may be seen to involve only the minimal effort and no expenditure of energy for transportation. It is the more readily available substitute for most urban and regional activities today and the danger of over-indulgence in this activity at the expense of many others in an age of increasingly scarce energy resources cannot be over-emphasized. The variety of activities constituting many current lifestyles could seriously be curtailed unless people and planners become fully aware of this threat and face the challenge.

As a pattern of activities, a lifestyle could be particular to an individual or to a household, by virtue of the similarity of activities and of the frequency of participation in them. A household's SYSTEM OF ACTIVITIES consists of the trips interconnecting the home to various locations and of the activities pursued at these locations. Chapin and Hightower (1966) describe such a system as "a form of descriptive geometry for the study of a social system". Activities can be viewed as "episodes in the life of an individual", family, or household and patterns of activities as "sets of connected episodes which have a propensity to recur in similar cycles".

In this project, a satisfactory cycle for the description of a lifestyle will be the year, but in order to place respondents at ease, the questionnaire or interview may refer to monthly habits or visits and refer also to other activities undertaken on a quarterly or annual basis.

While the necessity of work or economic activity is taken for granted for survival, the functions of leisure tend to vary considerably from person to person. These functions have been classified by Dumazedier (1967) as "relaxation, entertainment and personal development". He considers them interdependent and in accordnace with personal values they are allocated varying proportions of an individual's leisure time.

Beyond the varying allocations of time, there is also the spatial dimension of movements in the pursuit of activities related to a lifestyle, which are of great significance from the point of view of planning. Visits to various facilities, place of work and other destinations, if properly studied and interpreted, could provide clues as to the best arrangement of land uses to serve various lifestyles. The frequency by which various activities and trips to facilities providing for them are undertaken would be an important aspect of such a study.

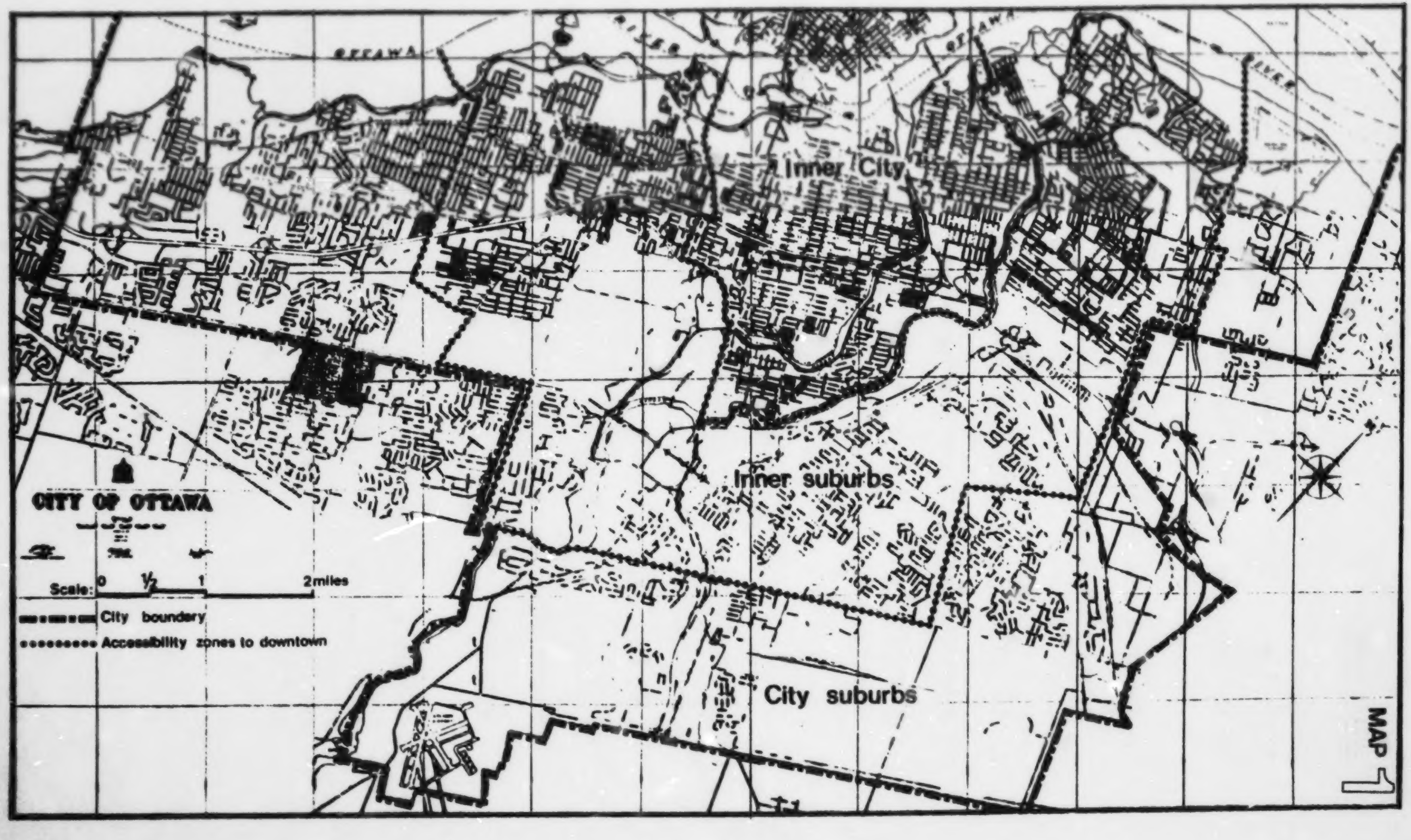
LIFESTYLE may therefore be said to embrace all aspects of human behaviour in a particular environment. As a reflection of the activity preferences of an individual or household, it must include the pursuits undertaken for the satisfaction of social, economic and leisure needs and the consequent movement to corresponding facilities and destinations. Among the principal factors of differentiation between individual lifestyles may be said to be age, income, level of education and the type, location and relative frequency of the activities undertaken by an individual, all of which depend on his personal values. Analysis of household lifestyles should also include the factor of household size.

For purposes of this project the following definition of "lifestyle" will be taken as a suitable guide for the design of surveys in relation to the objectives of this project:-

"LIFESTYLE is the sum total of activities and trips over the space of a year, undertaken by an individual or household in relation to their social and economic needs."

As the central interest in this project is the current and foreseeable patterns of energy use and their implications for land use, it would be worthwhile to adopt a definition for ENERGY USE related to this interest:-

"ENERGY USE is the sum total of renewable and non-renewable energies expended by a household in and around their home, in carrying out all essential social and economic activities."


OTTAWA RIVER
OTTAWA RIVER
Inner City
Inner suburbs
City suburbs
CITY OF OTTAWA
Scale: 0 1/2 1 2 miles
City boundary
Accessibility zones to downtown

MAP 1

SURVEY FRAMEWORK

In the light of these definitions, a number of parameters may now be selected for the conduct of surveys on current and foreseeable lifestyles, as follows:-

1. The basic unit for these surveys should be the HOUSEHOLD, whether it consists of one or several members;

2. The GEOGRAPHICAL DISTRIBUTION of the selected households should be even, in order to obtain a fully representative range of locations and lifestyles in the City. As utilities may be persuaded to release energy consumption data on a City block basis, it would be an advantage to adopt this basis. Moreover, each city block could be numbered in order to observe lifestyle and trip variations between locations as well as within city blocks - i.e. within similar locations. An assumption well-worth testing through the comparison of household trip length is that "Proximity to downtown crucially affects household trip lengths". It is therefore proposed to incorporate a special notation for "Inner City", "Inner Suburb" and "City Suburb" location of each selected household in the sample, adopting the zones shown in Map 1.

3. The sample of households selected should be sufficient to keep the margin of error within statistically acceptable limits. The "standard error of a sampling distribution of 2 proportions" as given by the formula:-

$$\sigma = \sqrt{\frac{pq}{N}}$$

where: 'p' Would be the proportion of households selected;
'q' the proportion of the remaining households; and
'N' is the total number of households.

In the case of Ottawa:-

Assuming 2.73 persons per household (1981) and dividing into the total population of approximately 303,000 (in 1981), the total number of households is 303,000/2.73 = 110,989 say 111,000

If 2,000 households are involved in the survey, then:-

p = 2,000 solving for the standard error
q = 109,000 $=\sqrt{2{,}000 \times 109{,}000/111{,}000}$
N = 111,000 = ±1.4%

This was considered very small and safe and it was therefore concluded that some 2,000 households should be approached in the proposed survey.

This large number of households for a survey on lifestyles - a rather unusual subject - had important implications on survey technique. A survey of current lifestyles was likely to require the respondent to give a great variety of factual information about his social and economic activities and the distances involved in reaching destinations providing outlets for them. Interview techniques were therefore dismissed in favour of the self-administered questionnaire, giving people ample time to recall activities, discuss then with members of the family and provide information at their own pace.

QUESTIONNAIRE DESIGN

As the first of two surveys on energy use patterns, current (1982) and foreseeable 1992 - the 1982 survey will crucially affect the conduct of the simulation games to establish possible 1992 patterns. It is therefore important to define the objectives and the types of information to be gathered by the survey and design the questionnaire accordingly.

The objectives of the 1982 survey of energy use patterns are as follows:

a. Cover the entire range of energy uses;
b. Account for household trips on a budgetary system extending over the entire year in order to include most frequencies of activity and thus provide a satisfactory description of a lifestyle;
c. Link household trips to energy conservation by enquiring about round trips to facilities car pooling and similar practices;

d. Establish household expenditure on energy in broad terms and also discretely ask for the total household income to be indicated.

e. Ask the head of a household the ways he has used to save energy at home and his suggestions to the Council to help people save energy. (Part of a continual survey on awareness in energy conservation matters.)

f. Establish age, occupation and level of education of each household member with no indication of individual names. (The choice of key Socio-economic variables related to energy conservation will be refined through a factor analysis of the data collected in the survey)

These objectives would no doubt require a long series of questions and in order to persuade households to self-administer such a lengthy survey questionnaire, the following decisions were reached:-

i) State the purpose and crucial importance of the survey and why its success depends on a response being received from every household in the sample;

ii) Re-assure respondents that all information received will be treated in strict confidence;

iii) Have the covering letter signed by the Mayor to emphasize the importance of the survey;

iv) Make the questionnaire available in English and French and use local people for the delivery to ensure that as far as possible, each household obtain the survey form in the language its choice;

v) Vary the colour of the paper to differentiate sections of the questionnaire;

vi) Reduce the text as far as possible and print in a reduced scale in order to minimize the volume of the questionnaire;

vii) Ask for household trips over the period of one month (June 1982) but in the frequency count, ask also for seasonal, quarterly or irregular trips, covering the whole year. (Only 2 household heads, out of 2,000 approached in the survey, actually phoned to enquire about this "mistake" in the questionnaire. During pilot surveys however, when information for the whole year was stated to be required in the title, complaints about this 'lengthy questionnaire' were more numerous.)

viii) Publicize the survey (See next page).

The draft questionnaire designed in the light of these objectives and decisions was tested through a pilot survey.

PILOT SURVEY

With a view of obtaining feedback, the draft version was now distributed to 24 households, several interested planners at City Hall and 10 teachers contacted by the Energy School Courses Advisor at the Ottawa Board of Education. Comments were also received from the Community Planning Advisory Branch of the Ministry of Municipal Affairs and Housing, University of Ottawa professors specializing on social surveys and members of the Community Resources Division at City Hall.

The feedback received from all these sources resulted in the final version of the questionnaire shown in the following pages.

conservation pipeline

THE HOUSEHOLD SURVEY OF TRIPS AND ENERGY USE

Your household may be among those selected by City Council to take part in a unique survey. On a form to be distributed to families in 100 City blocks, you will be requested to; (i) describe the trips that members of your household make to various facilities; (ii) give your idea of energy-saving round trips to various activities in your lifestyle; and (iii) suggest ways by which the Council could help people save energy. All this could be an enjoyable family game, as you pass the form from one to the other for everyone to record their trips and ideas.

The purpose of the survey is to collect information on the most frequent movements and activities, which distinguish Ottawa lifestyles from others. This information will help to plan the location of facilities in the City, so as to increase social convenience and energy conservation in our environment. We could all help in this by recording our movements and by suggesting round trips to enrich our lifestyles—even through the energy-tight 1980's.

YOUR OPINION MATTERS—SO MAKE IT COUNT!

City Council would greatly appreciate receiving your response to this survey. All the information you provide will be treated in strict confidence. Arrangements have been made for the collection of all survey forms, but you may prefer to send yours by mail, directly to:

THE CITY ENERGY PLANNER,
CITY HALL,
111, Sussex Drive,
OTTAWA, K1N 5A1

HELP CITY COUNCIL MAKE OTTAWA THE ENERGY-EFFICIENT CAPITAL

DISTRIBUTION OF THE QUESTIONNAIRE

As the covering letter to the questionnaire indicates, distribution and collection through appointed persons was preferred to mailing. The reasons for this preference were as follows:-

a. Employment of local students in an area would make it possible to give each household an English or French questionnaire according to choice. The alternative of printing a bilingual questionnaire would make it too voluminous - therefore less attractive to respond to and considerably more expensive to print and collate, in view of the fact that only 22% of all households in the City are Francophone. Unfortunately some students did not bother to check the language of some households and a total of 9 letters and telephone calls were received to complain on the matter of language. A typical response to these complaints signed by the Mayor is shown on the next page. In order to place this failure in a proper perspective, it should be emphasized that only 9 out 2,000 questionnaires appear to have been wrongly distributed.

b. The response to a mail questionnaire is usually reckoned to amount to no more than 25% to 30% of the number of forms mailed out. As the response received by student distribution and collection was 37.6% (See THE RESPONSE below) the selected method was justified.

c. The involvement of students in this planning survey may have been on the basis of summer employment, but it was considered meaningful from the point of view of public awareness and participation in planning. Ideally, every age group and section of society should be given some opportunity to be involved - or at least educated - in planning.

CD-154-1

August 20, 1982

Mrs. Williemina Altmann
755 Dickens Avenue
Ottawa, Ontario
K1G 2X7

Dear Mrs. Altmann:

I sincerely appreciate your concern of a 'french only' Energy Survey distributed to you by the City of Ottawa, Department of Community Development. As you aware, the City of Ottawa has a policy to work in both official languages.

To provide employment to students over the summer months, the Department of Community Development set up a distribution system whereby high school students would personally distribute the forms and arrange for return by either pick up or mail. Depending on the choice of the participant, English or French versions of the Survey Form were distributed. Obviously this procedure failed in your case.

I regret any inconvenience to you and hope this oversight will not discourage you in participating in the survey.

Attached is an 'english only' version of the Survey Form and letter. Your contribution to this survey response would be most appreciated.

Sincerely,

Marion Dewar
Mayor

PP:cmm-5
[illegible]

[illegible]

COLLECTION OF THE QUESTIONNAIRE

The most important reason for the employment of students was the possibility of arranging a personal collection of the questionnaires, in order to boost up the response. As the covering letter indicates, each household was given 3 days to fill-in the questionnaire and have it ready for collection. As the selected households were grouped in city blocks, it was relatively easy for a student to distribute and subsequently collect the questionnaire. Some problems were however, encountered and they were ironed out as follows:

1. "Nobody at home to return the questionnaire". In all these cases the student left a brief letter requesting return by mail, as shown on the following page.

2. "Nobody has come to collect the questionnaire". A self-addressed and stamped envelope was sent for the response to be mailed.

3. "I shall be on holidays in 3 days' time". These respondents were requested to fill in the questionnaire as soon as possible and mail it to City Hall.

RELUCTANCE TO RESPOND

A considerable number of elderly people phoned to indicate such reluctance, pointing out that they did not visit facilities other than shops, the bingo hall (or whatever) and they did not therefore feel that their response would be of any value to the City.

It was explained to them that the Planning Branch needed information about all age groups and types of people in the City, in order to plan and provide facilities for their needs. It would be very unfair to elderly people if unwittingly, their needs were disregarded simply because inadequate data about them were collected during the survey. If only a few facilities were visited at present, here was an opportunity to make further needs known, in order to improve the City from the point of view of the elderly.

Most callers accepted this argument and it seems that they subsequently did respond, because according to Table 1 (Key Statistics) there was no defficiency in the response from the elderly.

THE RESPONSE

A total of 753 responses were received indicating a response rate of 753/2,000 = 37.6%. As only 604 replies were actually required, this response rate was deemed satisfactory. The first requirement before analysis was to allocate each response to an accessibility zone in order to test the hypothesis as to whether residential proximity to facilities affects household lifestyles and energy consumption.

ALLOCATION TO ACCESSIBILITY ZONES

While the majority of responses were automatically allocated into Inner City, Inner Suburb and City Suburb zones at the time of collection - by recording the number of a city block on the envelope containing a response - a certain proportion (17.2% of the total) were returned by mail and had to be allocated by the following method.

i) The average distance travelled to a number of scarce facilities was calculated for each zone, using the responses collected in that zone. These key facilities were: Shopping centre and Hospital in the first instance, with distances to University, Concert Hall and City Hall being used to confirm a zone.

ii) Each response returned by mail - as opposed to collection by hand - was subsequently examined by the computer in terms of distances to the scarce facilities. If the majority of these distances fell within the averages calculated for a zone then automatically, the response was allocated to that zone. A few cases appearing to fall within 2 zones were allocated by reference to further facilities like secondary schools and sports arenas.

TESTS

Following the above allocation, a number of tests were carried out on the data before attempting an analysis:-

a. Even geographical distribution: The number of responses received from each of the Accessibility Zones shown on Map 1 was compared on the basis of the density of households resident in each zone. The highest rate of response was to be found in the Inner City the lowest in the City Suburbs. The households resident in these three zones were calculated on the basis of the 1981 Census and it was found that they approximate the following ratio:-

Inner City:	1.0
Inner Suburbs:	1.0
City Suburbs:	1.5

In order to adjust the response received from each zone to the above ratio, a number of partially-filled or otherwise unclear questionnaires received from the first two zones were dismissed.

b. A control sample survey was commissioned for a comparison of some key statistics to ensure fair representation of all walks of life and conditions in the large survey. Key statistics were considered to be the following:

Ratio of: Anglophones to Francophones
Accessibility Zones (to each other)
Age groups: Less than 20
20 - 29
30 - 49
50 and older

Net Household Income groups:
Less than $10,000
$10,001 - $20,000
$20,001 - $30,000
over $30,000

The Control Sample Survey was carried out on the basis of 100 evenly distributed responses. The consultants were Socioscope Ltd. and their report is shown in Appendix 1. The comparison of CONTROL SAMPLE and LARGE surveys in terms of the above-mentioned key statistics was as follows:-

TABLE 1: COMPARISON OF CONTROL SAMPLE AND LARGE SAMPLE IN THE KEY STATISTICS

Key Statistic	Control Sample	Large Sample
Anglophones	90	85.8
Francophones	10	14.2
Inner City response	38	34.6
Inner Suburbs response	38	34.9
City Suburbs response	22	30.5
Age group 20 (-)	23	24.2
Age group 20 - 29	18	19.1
Age group 30 - 49	29	28.1
Age group 50 (+)	31	28.6
Hshld income $10,000(-)	17	14.6
$10,001 - $20,000	17	18.5
$20,001 - $30,000	19	20.8
$30,000(+)	48	46.1

This test indicated that the affinity of the two samples in terms of the key statistics was close and satisfactory.

c. Seriously defficient responses - which contained no information on kmileage (number of kms) to various facilities visited, or no indication of household characteristics. These amounted to 1.4% of the total and they were weeded out of the Large Sample during these tests, in order to ensure that computation was not hampered by practically blank entries.

Following these tests and verifications the data were processed by computer, contracts being awarded partly to the University of Ottawa and partly to Carleton University in order to obtain results as soon as possible.

GA:cse-4

A2D035

THE ANALYSIS OF SURVEY DATA

The total of some 130 variables of information entered on the questionnaire by 604 respondents yielded over 78,000 bits of information. These had to be carefully analyzed through computer processing, in order to produce relevant facts in relation to the objectives of the project. The particular objective pursued by the survey at this stage of the project was to establish current (1982) patterns of energy use and household trip in order to set up a basis for projections - projections of energy use and foreseeable change in lifestyles by 1992.

PRINCIPAL COMPONENTS ANALYSIS

The purpose of this mathematical analysis of a set of data is to identify a small number of components which explain most of the variation exhibited by the original set of data. The "principal components" represent a précis of the information contained by the entire set of data and a study could therefore concentrate on their further analysis to arrive at conclusions without fear of any significant facts having been overlooked.

The economy of time and money is only part of the advantages offered by Principal Components Analysis to the urban planner, or any other professional interested in the diagnosis and resolution of problems. The main advantage is the identification of key variables, factors or aspects of a problem, on which to concentrate effort and resources, in order to arrive at solutions quickly.

economically and in times of impending disaster, promptly. Far from being a lazy or parsimonious approach to the resolution of problems, the underlying philosophy of Principal Components Analysis has been stated most eloquently by Pareto (1971) in the following maxim which is often referred to as "the Pareto Principle":

> "In any series of elements to be controlled, a small fraction of them in terms of numbers, will often account for almost the entire series, in terms of effects."

In this project, Principal Components Analysis was employed four times to summarize data, extract significant messages and identify key variables as regards current Ottawa lifestyles, as follows:-

1. Analysis of Household Trips, Energy Use and Socio-Economic Variables, 1982

   This involved all 131 variables of information collected on 604 households in the City and by mathematical processing of similar pairs, or substitutes of one for the other, reduced them to a significant 24, as shown on Table 2. In the process, 6 important Components or "messages" were discovered as to what factors underly the variation exhibited by the 604 households, studied in terms of 131 aspects of their trips, energy use and socio-economic characteristics. These components or messages were a matter of interpretation, by looking carefully at the significant variables listed under each Principal

TABLE 2: PRINCIPAL COMPONENTS ANALYSIS OF HOUSEHOLD TRIPS, ENERGY USE AND SOCIO-ECONOMIC VARIABLES, 1982

PRINCIPAL COMPONENTS

I		II		III	
(Vulnerable lifestyle)		(Energy waste)		(Age and Dist. to facilities)	
		Percentage of total variance explained			
14.4%		13.3%		11.5%	
Variable	Load	Variable	Load	Variable	Load
Cottage dist.	.90	Husband's wrkplce distance	.65	Movies dist.	.64
No. of persons in household	.66	Exp. on oil for heating	.60	Age of hsld head	.58
Exp. on gasoline	.42	Total income of the household	.60	Shopping centre distance	.44
Restaurant dist.	.39	Occup'n of hsld head	.42	Theatre dist.	.43
Exp. on car(s)	.38	Educ'n of hsld head	.38	Total kmileage	.42
VI		V		VI	
(Components VI-VI:		Conserver habits, characteristics and outlets)			
9.0%		8.2%		7.2%	
Sports arena distance	.61	Educ'n of hsld head	.47	Park/Play area distance	.59
No. of facilities visited in "round trips"	.54	Exp. on electricity	.46	Educ'n of 2nd household member	.48
Exp. on nat. gas	.32	Use of solar heating	.36	Public transp. expenditure	.45

Abbreviations:
Dist. = Distance
Nat = Natural
Transp= Transport
Wrkple = Workplace
Exp. = Expenditure
Hsld = Household
Occup'n = Occupation
Educ'n = Education
Kmileage= kms/annum

Note: Cumulative total of variance explained by the above 6 components is 63.9% - i.e. about two-thirds of the total variation of all variables.

GA:cmm-3
D2D013

Component. Component I for example, had five significant variables - among other less significant ones, some positive, others negative - which were as follows:

a. Distance to the cottage (from home)
b. Number of persons in the household
c. Expenditure on gasoline
d. Distance to restaurants (from home)
e. Expenditure on car(s) used by the household

Evidently all these variables are related to the use of energy and they indicate the aspects in which some of the households were exceptional - i.e., they varied from the others. Now if the distance to the cottage, the number of persons in the household, the expenditure on gasoline, etc. are the exceptional characteristics of the household, evidently it must depend heavily on the availability of energy. As "Total income" is not one of its exceptional attributes, the lifestyle of this household must be very vulnerable to energy price hikes and to energy scarcity in general. Hence the naming of the Princial Component as "Vulnerable lifestyles." This Component or factor explains 14.4% of the total variation in the original 78,000-odd data and has the highest explanotory power among the six Principal Components identified. A study of these six components, in terms of the 24 variables in their composition could reach conclusions with a 63.9% probability of accuracy, as indicated by the footnote on Table 2. This is analogous to reading the précis of a book, rather than the whole book - one may

TABLE 3: PRINCIPAL COMPONENTS ANALYSIS OF ENERGY USE AND SOCIO-ECONOMIC VARIABLES, 1982

PRINCIPAL COMPONENTS

I		II		III	
(Car(s), Income, Occup'n)		(Educ'n, Gas, Occup'n)		(More gas, Age, and Income)	
Percentage of total variance explained					
15.5%		12.3%		10.7%	
Variable	Load	Variable	Load	Variable	Load
Exp. on car(s)	.66	Educ'n of 2nd member in hsld	.66	Exp. on gasoline	.50
Total kmileage	.63	Educ'n of hsld head	.66	Age of hsld head	.42
Age of 2nd member of hsld	.63	Exp. on gasoline	.48	Total income	.38
Total income	.56	Occup'n of head of hsld	.31	Exp. on heating oil	.37
Age of hsld head	.45				
Exp. on gasoline	.41				
Occup'n of hsld head	.39				
Occup'n of 2nd hsld member	.33				

8.8%		7.6%		7.1%	
(Conserver habits)		(Conserver pioneer hslds)		(Use of non-renewables)	
Variable	Load	Variable	Load	Variable	Load
Exp. on public transport	.43	Exp. on nat gas	.73	Use of gasoline for transport	.59
Educ'n of hsld head	.42	Use of solar heating	.47	Exp. on heating oil	.38
Exp. on nat. gas	.40	Exp. on public transport	.33		
Educ'n of 2nd member of hsld	.33				

Abbreviations:
Exp. = Expenditure
Hsld = Household
kmileage = kms/annum
Occup'n = Occupation
Educ'n = Education
Nat. gas = Natural gas

Note: Cumulative total of variance explained by the above 6 components is 62.3% - i.e. just below two-thirds of the total variation of the 65 variables originally considered.

miss some detail, but one gains a lot of time. And if the précis contains 63.9% of all the facts in the book - i.e., the majority of all the facts contained in the book - then the gain in time has been well worthwhile.

2. Analysis of Energy Use and Socio-Economic Variables

This involved only about 65 variables - i.e., about half the total - and resulted in the identification of 15 key variables, as shown on Table 3. Some of these are repeated in several Principal Components - as for example, EXPENDITURE ON GASOLINE, which is repeated 3 times. This emphasizes the significance of a variable.

3. Analysis of Household Trips and Socio-Economic Variables, 1982

A total of 87 variables were analyzed and reduced to 16, three of which are SOCIAL VISITS to various friends - Table 4. A further four variables are repeated in at least two Components because of their high significance - COTTAGE, LIBRARY AND SOCIAL VISITING DISTANCES, followed by RESIDENTIAL LOCATION IN THE INNER CITY.

4. Analysis of Household Trips, 1982

This involved 69 facility trips described in terms of transport mode, frequency of visit and distance to facility - i.e., 69 x 3 = 207 variables. A more advanced and considerably more expensive form of

TABLE 4: PRINCIPAL COMPONENTS ANALYSIS OF HOUSEHOLD TRIP AND SOCIO-ECONOMIC VARIABLES, 1982

PRINCIPAL COMPONENTS

I		II		III	
(Entertainment)		(Leisure activities)		(Age and Resid'l location)	
		Percentage of total variance explained			
15.8%		13.9%		11.1%	
Variable	Load	Variable	Load	Variable	Load
Social visit (3)	.84	Cottage	.68	Age of hsld head	.52
Park/Play area	.71	Library	.65	Loc'n in Acc Zone 2	.44
Movies	.63	Social visit (2)	.26		
Restaurant	.57			Loc'n in Acc Zone 1	.34

IV		V		VI	
(Occup'n, Leisure, Income)		(Social visiting)		(Recreation, Location, Education)	
9.6%		8.4%		7.8%	
Occup'n of hsld head	.54	Social visit(2)	.65	Sports arena	.83
University	.44	Social visit(4)	.41	Loc'n in Acc Zone 1	.76
Cottage	.42	Social visit(6)	.34	Educ'n of hsld head	.34
Library	.39				
Total income	.31				

Abbreviations:
Acc Zone = Accessibility Zone (see Map 1)
Occup'n = Occupation
Educ'n = Education
Resid'l = Residnetial
Hshld = Household
Loc'n = Location

Note: Cumulative total of variance explained by the above 6 components is 66.6% - i.e. precisely two-thirds of the total variation of the 87 variables originally considered.

TABLE 8: FACTOR ANALYSIS OF HOUSEHOLD TRIPS TO FACILITIES, WORKPLACES AND FRIENDS, 1982

FACTORS

I		II		III	
(Culture/Public Services)		(Basic needs)		(Health and recreation)	
		Percentage of total variance explained			
31.1%		16.0%		6.3%	
Destination	Load	Destination	Load	Destination	Load
Museum	.99	Shopping centre	.99	Sports area	.97
Gallery	.99	Bowling alley	.99	Dental facility	.69
Clinic	.99	Park/play area	.95	Family doctor	.68
Regional Gov't	.99	Botanical Gdns	.94	Convenience shops	.64
Prov. Ministry	.99	Sibling 1 Workplace	.93		
Federal Ministry	.99	Eye doctor	.71		
Concert Hall	.96	Swimming pool	.70		
Wife's workplace	.90	Theatre	.70		
Hospital	.81	Pharmacy	.66		

IV		V		VI	
(Private outlets)		(Insurance for the future)		(Social visiting)	
5.2%		4.2%		4.0%	
Club/Society	.97	Church	.91	Social visit (5)	.76
Private parties	.68	Day Care	.57	Social visit (4)	.67
Market	.44	Bank	.61	Social visit (6)	.65

Note: Cumulative total of variance explained by the above 6 components is 62.8% - i.e. just about less than two-thirds of the total variation of the 69 variables originally considered.

Principal Component Analysis was used to process this highly diverse data, which is known as Factor Analysis. This operation is based on numerous iterations to establish similarities and substitutes by progressively coarser comparisons. A total of 23 iterations were required to produce the six significant factors shown on Table 5. The progressively coarser comparison of variables has resulted in a high explanatory power for Factor I - no less than 31.1% - and very low ones for Factors III to VI. The identification of 31 facilities as providing the key experiences in Ottawa lifestyles is most important and an attempt will be made to use this result in the Survey of Foreseeable Lifestyle Changes to 1992, in Stage 3 of the project.

These four analyses allowed a methodical search for meaningful information and conclusions in respect of the objectives of the project. As the order of priorities in this project is to understand local lifestyles before tempering with the arrangement of land uses in an area, the first purpose to which the results of Principal Components and Factor Analysis were called to serve was the identification of Ottawa lifestyles. It was considered essential to define and visualize these lifestyles at the outset in order to understand them and later to plan for their social and economic activity needs in the City. The process of identification is shown as a series of Tables (6 to 9) in the pages that follow.

GA:cse-4

D2D024

Table 6: THE MOST SIGNIFICANT GROUPS OF HOUSEHOLD TRIP VARIABLES, 1982

Note: Grouping destinations by affinity - e.g. all social visits together, all work trips together, etc. - and totalling up the loading scores for each group, as indicated by Factor and Principal Components Analyses, the following indication of relative order of significance in household trips was obtained.

---

1. WORKPLACE destinations of the household: Wife's, Siblings' and Husband's workplaces in that order (it seems the husband helps the other members of the household commute to their workplace, at least occasionally - hence the higher significance of the wife's workplace destination, in comparison to the husband's).

2. SOCIAL AND ENTERTAINMENT destinations: Visits to friends, restaurants, movies, private parties and clubs or societies, in that order.

3. SHOPPING AND BANK destinations: Shopping centre, convenience shops, market, bank, extended hours store, in that order.

4. RECREATIONAL destinations: Country cottage, park/play area, sports arena, bowling alley, swimming pool and Botanical Gardens, in that order.

5. HEALTH - related destinations: Clinic, hospital, pharmacy, family doctor, dental facility and optician, in that order.

6. CULTURAL destinations: Museum, art gallery, theatre, concert hall, church and library, in that order.

7. GOVERNMENT destinations: Regional Government, Provincial Ministry and Federal Ministry, in that order.

8. EDUCATION - related destinations: Daycare or Nursery Schol, and University (as most journeys to Primary and Secodary schools are by modes other than the private car, they do not undermine the prosperity or lifestyle of a household.)

The number of facilities visited in "ROUND TRIPS" within the City has been indicated as a variable with a significant loading in the CONSERVER HABITS Factor.

Table 7: THE MOST SIGNIFICANT GROUPS OF SOCIO-ECONOMIC VARIABLES, 1982

Note: Grouping variables by type - e.g. all age characteristics together, all educational characteristics together, etc. - and by adding up the loading scores for each type, as indicated by Principal Components Analysis, the following indication of the relative order of significance of socio-economic variables was obtained.

---

1. NO. OF PERSONS IN THE HOUSEHOLD: It may be self-evident that the number of persons in a household is bound to affect expenditure and use of energy in that household, but the indication that it is a characteristic of prime importance among all socio-economic variables is most useful. One implication may be that at a time of a severe energy crisis, people might even consider having fewer children. But it would be idle speculation at this stage to pinpoint a single factor for a drop in birthrates in the future.

2. OCCUPATIONS OF THE HEAD AND OF THE 2ND MEMBER OF THE HOUSEHOLD
These were component variables in no less than five various Factors or Principal Components indicated by the analyses.

3. TOTAL NET INCOME OF ALL HOUSEHOLD MEMBERS
As above, but in four Factors or Components.

4. RESIDENTIAL LOCATION OF THE HOUSEHOLD BY ACCESSIBILITY ZONE

5. EDUCATION OF THE HEAD AND OF THE 2ND MEMBER OF THE HOUSEHOLD

6. AGE OF THE HEAD OF THE HOUSEHOLD

Table 8: THE MOST SIGNIFICANT GROUPS OF ENERGY USE VARIABLES, 1982

Note: Grouping variables by type - e.g. all expenditures together - and by adding up the loading scores for each type, as indicated by Principal Components Analysis, the following indication of the relative importance of energy use variables was obtained.

---

1. EXPENDITURE ON OIL AND PRIVATE CAR(S): Expenditure on gasoline, on car(s) owned or leased but operated by the household and on heating oil are the important items in this group, followed by total kmileage run by private car(s) in the family, in that order of priority. It is most significant that "Expenditure on Gasoline" was a component variable in no less than five Factors or Principal Components, indicated by the analyses.

2. EXPENDITURE ON NON-OIL FUELS AND ON PUBLIC TRANSPORT: Expenditure on natural gas and electricity, followed by passive or active uses of solar energy and by expenditure on public transport, in that order of priority.

Group 1 expenditures above indicated the Frivolous Lifestyles, while Group 2 expenditures indicate the Conserver Ethic. The selection of "orthogonal factors" - i.e. factors which if traced on a graph of a Factor Analysis would run at right angles (90°) to each other - makes it possible to identify characteristics of contrasting lifestyles in a community.

IDENTIFICATION OF OTTAWA LIFESTYLES, 1982

The grouping of variables and the identification of the most significant socio-economic and energy-use characteristics in particular, led to the following parameters for the identification of lifestyles in Ottawa:-

A. SIGNIFICANT SOCIO-ECONOMIC VARIABLES:

1. Number of persons in household - the 1982 survey included housholds with 1 to 6 members.

2. Occupations of the principal 2 members of a household - The variety of occupations established by the 1982 Survey could be classified into the standard groups of Professional, Managerial, Clerical, Skilled Technical, Unskilled and others. If the principal 2 members of a household are in vastly different occupations - i.e. a 'managerial' husband married to a 'clerical' wife - it may be safely assumed that the household's standard of living and behaviour is conditioned by the higher occupation spouse - in the above example, the 'managerial' husband.

3. Total net household income - identified in four denominations in the Survey:-

(i)	Less than $10,000	(iii)	$20,000 - $30,000
(ii)	$10,000 - $20,000	(iv)	over $30,000

4. Residential location - identified in terms of three Accessiblity Zones in the Survey:- (See Map 1)
   a. Inner City
   b. Inner Suburbs
   c. City Suburbs

5. Education of the principal 2 members of a household

(i)	Primary School	(iv)	University under-graduate
(ii)	Secondary School	(v)	University post-graduate
(iii)	Technical		

   Once more, the higher education spouce may be assumed to set the standard.

6. Age of the household head identifiable as:-
   a. Young (aged 17-35)
   b. Middle aged (36-64)
   c. Retired (65+)

B. SIGNIFICANT ENERGY USE VARIABLES

1. Frivolous energy users showing high expenditure on gasoline and heating oil and registering a high total kmileage on the private car.

2. Conservers showing expenditure on natural gas and electricity and keen on the active or passive use of solar energy and public transport.

Considering A and B as the main dimensions for the identification of lifestyles from the view-point of energy use, the following variety of lifestyles can be generated:-

	No. of Socio-Economic Parameters	No. of Energy-Use Parameters
Household size:	6 sizes or variations	2 variations (see above)
Occupation:	6 groups	
Income:	4 denominations	
Location:	3 zones	
Education:	5 levels	
Age:	3 brackets	

Variety of Ottawa lifestyles = 6 x 6 x 4 x 3 x 5 x 3 x 2 = 12,960

This enormous variety of lifestyles in a city may be a fascinating subject to pursue, but in a research study with carefully defined urban planning objectives strictly related to energy, it is proposed to reduce the variety of lifestyles for further investigation as follows:-

	Relevant Socio-Economic Parameters	Energy-Use Parameters
Household size:	6	2 (as above)
Location:	3	

Variety of Ottawa lifestyles: 6 x 3 x 2 = 36

In addition to strict relevance, a second advantage of this reduction is to be found in the simplification of nomenclature - for example:-

Single-person, Inner-City, Converver lifestyle, (or)

Six-person, City-Suburb, Frivolous lifestyle.

These terms are certainly more manageable than if all 7 possible parameters had been selected:-

Young, Single-person, High-income, Inner-City, University-educated, Professional, Frivolous lifestyle, (or)

Retired, Two-person, Low-income, City Surburb, Primary-education, ex-unskilled labour, Conserver lifestyle.

It is therefore proposed to adopt only three parameters in order to keep the discussion relevant to Energy-use and Land-use factors.

Table 9: IDENTIFICATION OF OTTAWA LIFESTYLES, 1982
(by reference to Household size, Residential location and Energy use parameters)

Abbreviation Code	Household Size	Residential Location	Energy use Habits
1-p.IC.C	Single-person	Inner City	Conserver
2-p.IC.C	2 - person	Inner City	Conserver
3-p.IC.C	3 - person	Inner City	Conserver
4-p.IC.C	4 - person	Inner City	Conserver
5-p.IC.C	5 - person	Inner City	Conserver
6-p.IC.C	6 - person	Inner City	Conserver
1p.IS.C	Single-person	Inner Suburb	Conserver
2p.IS.C	2 - person	Inner Suburb	Conserver
3p.IS.C	3 - person	Inner Suburb	Conserver
4p.IS.C	4 - person	Inner Suburb	Conserver
5p.IS.C	5 - person	Inner Suburb	Conserver
6p.IS.C	6 - person	Inner Suburb	Conserver
1p.CS.C	Single-person	City Suburb	Conserver
2p.CS.C	2 - person	City Suburb	Conserver
3p.CS.C	3 - person	City Suburb	Conserver
4p.CS.C	4 - person	City Suburb	Conserver
5p.CS.C	5 - person	City Suburb	Conserver
6p.CS.C	6 - person	City Suburb	Conserver

Note: The second Energy-Use parameter of "Frivolous Habits" generates a further 18 lifestyle descriptions which would be coded:
1-p.IC.F (plus further 5)
1-p.IS.F. (plus further 5)
1-p.CS.F (plus further 5)

It is important to emphasize that the 36 lifestyles generated by the above parameters of Household size, Residential location and Energy use habits are not a small part of the enormous variety of 12,960 Ottawa lifestyles, but only a less sophisticated subdivision of the total variety, to make it relevant to this particular project.

GA:cse-4
D2D023

SECTION 3

THE LINKAGE OF FACILITIES

The variety of facilities invented by people over the centuries is continually growing. Some are located in isolation but increasingly, they are made part of a complex of various facilities in a regional centre, a neighbourhood centre, a downtown complex, etc. It would be worth investigating the factors that bring together facilities into a cluster, in order to increase the scope for multi-purpose trips. The advantage of these trips for the social convenience of the user of facilities and for energy-saving, cannot be overestimated. They allow him to save time and money, buy products and services in a sequence that becomes synergetic - it generates demand through impulsive buying - and makes the experience of shopping, or the 'nite-out', or any other trip more pleasant and truly urban.

Some of the factors which bring facilities together into a complex have been studied. Among a variety of writers, Rannells (1956) has indicated the need for comparison by consumers as they shop around; Hawley (1950) has coined the term COMMENSALISM - i.e. collective appeal to the consumer by reason of functional relation and proximate location; Ackoff (1962) has attempted to mathematically formulate the benefits of interaction due to clustering; and finally, Lean and Goodall (1966) have put forward COMPLEMENTARITY - the provision of a more 'complete' range of goods and services. The exchange of goods, as in the case of manufacturing industries, may also cause agglomeration (Weber, 1909) but service industries being predominantly consumer oriented, are little affected by that need. In none of these studies however, is there any reference to the similarity in energy requirements of facilities, as a reason for their clustering.

The energy requirements of facilities may be established by reference to the dominant mode of transport used by the consumer in reaching a facility. A primary school for example is reached predominantly through walking, while a cinema in the evening, even if located within walking distance of say 10 minutes, tends to attract the motor car as the dominant mode of access. In an energy-conscious era, these characteristics of a facility cannot be disregarded.

The studies required as an integral part of this approach were as follows:-

1. Existing (1982) distribution of various types of facilities in the City.
2. Survey of energy use and household trips to various facilities in 1982.
3. Groups of facilities attracting similar frequency of use by consumers.
4. Groups of facilities with similar hours of operation.
5. Groups of facilities attracting similar modes of transport - or combination of modes - for access by consumers.
6. Groups of facilities with similar 'demand cones' describing their market areas.
7. Groups of facilities with similar frequency of use, hours of operation, mode of transport for access and 'demand cone' characteristics.

8. Hypothesized clusters of facilities offering the widest scope for multi-purpose trips.

9. Verification of the hypothetical clusters through game simulation survey of household trips to various facilities under the assumption of progressively restrictive energy-use scenaria.

10. Comparison of verified multi-purpose complexes of facilities with existing clusters in the City.

11. Identification of desirable clusters in various parts of the City to promote greater social convenience and energy savings for the consumer.

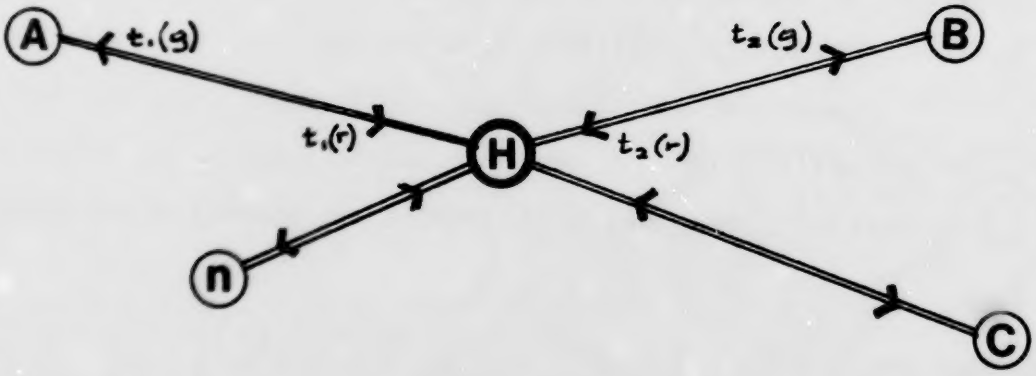
All these studies are described in the following four Sections of this report. Analytical tables relating to studies 3-7 have been placed in Appendix 5 and the results will be found on Diags 10-20 and Tables 19-21.

THE BENEFITS OF CLUSTERING

As a starting point to a study towards more energy-sufficient patterns of distribution of facilities, it would be appropriate to illustrate mathematically the self-evident fact that the clustering of interrelated activities confers considerable benefits to the consumer and the supplier of services. INTERRELATED ACTIVITIES may be considered all those which at any point in space or time and for people of any lifestyle, could form part of a multi-purpose trip. The 'nite-out' in Ottawa for example, may include a visit to the restaurant, then going to the theatre, subsequently having coffee and finally strolling along the Rideau Canal. If all these facilities A, B, C,...n are randomly scattered all over the City, the number of trips required to visit them all from a home base 'H' could be shown as a diagram and a matrix as follows:-

	TRIP PURPOSE AT ORIGIN	TRIP PURPOSE AT DESTINATION				
		H	A	B	C	n
Home:	H	-	$t_1(g)$	$t_2(g)$	$t_3(g)$	$t_n(g)$
Facilities:	A (Restaurant).........	$t_1(r)$	-	-	-	-
	B (Theatre)............	$t_2(r)$	-	-	-	-
	C (Café)...............	$t_3(r)$	-	-	-	-
	n (Canal)..............	$t_n(r)$	-	-	-	-

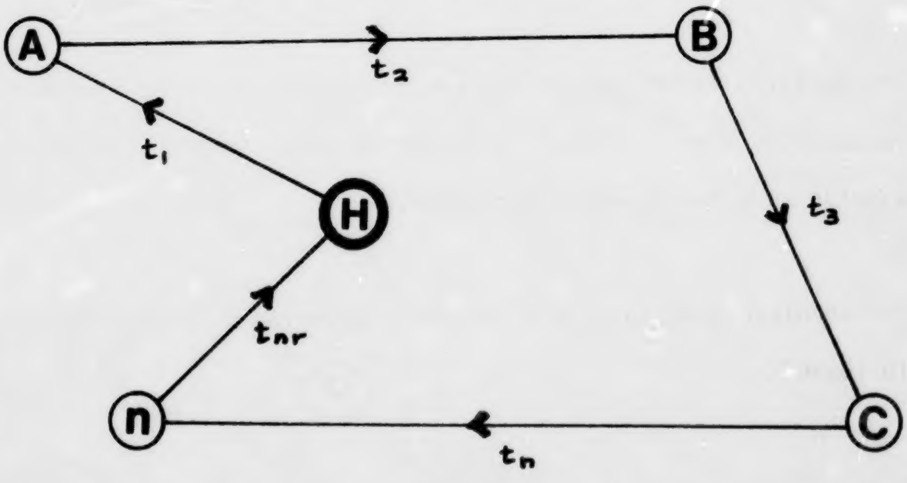
where $t(g) + t(r)$ are the 'go-and return' journeys of a two-leg trip from home to each facility - see explanatory diagram.



The distances and time taken by all these journeys would probably discourage any couple from undertaking such an arduous 'nite-out'. If however, the facilities were arranged in circular or peripheral fashion around Home so as to enable a 'round trip', the matrix of distances would be as follows:-

		H	A	B	C	n
Home:	H	-	t_1	-	-	t_n
Facilities:	A (Restaurant).........	-	-	-	-	-
	B (Theatre)............	-	t_2	-	t_3	t_{nr}
	C (Café)...............	-	-	-	-	-
	n (Canal)..............	-	-	-	-	-

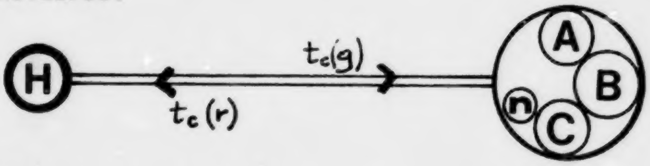
where t_1, t_2 ... t_{nr} are various parts of the round trip, the sum of distances involved being less than the sum of go-and-return journeys to visit the previously considered disparate facilities.



If the facilities are now clustered into a single destination, the trips are drastically reduced to a simple two-leg trip as follows:

		(H)	(A + B + C + ...n)
Homes:	(H)	-	$t_c(g)$
Cluster:	(A + B + C + ...n)	$t_c(r)$	

where $t_c(g)$ and $t_c(r)$ are to go-and-return journeys of a two-leg multi-purpose trip, the sum of distances involved being less than the 'round trip' distance previously considered.



The clustering of activities may result in some longer distances being travelled by some households on the periphery of a community to reach some of the activities. The aggregrate of distances from all homes to the cluster however, will be considerably less. The size and areal extent of the community will determine whether the scale of distances involved would necessisate bus or private transport, cycling or just walking.

The decision as to whether any two activities could be linked by the flow of pedestrians when a cluster is formed would be reached through consumer trip simulation games as explained later.

The architectural solutions for the clustering of linked activities include the following:-

a. Grouping in a single building, with stairs, escalators, elevators or corridors providing the circulation or linkage space;

b. Grouping around a plaza, which may be open, covered or underground;

c. Forming a pedestrian mall, which may also be open, covered or underground;

d. Forming a campus or complex of buildings, connected by covered ways, footpaths, cyclepaths or navigable water - e.g. Colleges at the University of Cambridge, England.

e. Allowing the multiple use of an outdoor or indoor space through the programming of activities.

It may be seen from the above that the clustering of interrelated activities to encourage multi-purpose trips is the essence of urban life, land use layout and building complex design. The benefits to the consumer include social convenience, energy conservation, comparison of goods or services in quality and price, chance meetings with friends, impulse buying, shop-window gazing, learning about the latest fashions, discovering new products and other innovations, a sense of enclosure into a civilized environment, designed to respond to a wide range of human needs - in brief, a sense of urbanity.

The benefits to the entrepreneur or supplier of services or facilities are also considerable:- Increased trade due to the larger flow of pedestrians, as all interrelated facilities jointly appeal to the consumer - (Commensalism, according to Hawley, 1950), a sense of being 'on the market' and competing with the best shops in the trade, more trade due to impulse buying by the consumer, sharing a prestigious address and being 'in the centre of things', etc . It should therefore pay handsomely for both supplier and consumer of services to cluster facilities at a location accessible to both.

HYPOTHESIZED CLUSTERS

The analytical tables relating to studies 3-7 above - see Appendix 5 in APPENDICES volume - have been aggregated into a single summary Table 10. This represents the cummulative considerations which would make any pair of facilities compatible to each other. COMPATIBILITY may be measured by the frequency of pedestrian exchanges between two activities. If they have the same hours of operation during the 24-hour cycle, they are accessible by the same mode of transport and they also have similar market areas for example, then consumers are very likely to make them part of the same multi-purpose trip and walk from one to the other.

The derivation of clusters of compatible facilities by this method may be considered only as a starting point however, because it requires verification. The flow of pedestrians from one facility to the other has to be either observed on the ground - if they are located within sight or walking distance in a mall, for example - or be indicated as part of a multi-purpose trip by a significant number of respondents to a survey. In this project, this verification will be based on testing against the personal value systems of a reliable sample of Ottawa households to ensure that whatever clusters of facilities - i.e. mixed land use patterns - are put forward for consideration in the City's Official Plan, they will be acceptable to local lifestyles, as at present constituted, or as likely to change under foreseeable circumstances in the Ottawa region. This survey will be described in Section 4.

Table 10: HYPOTHESIZED CLUSTERS OF FACILITIES

CLUSTER 1

Primary School
Play Area/Park
Kindergarten
Daycare
Convenience Shops
Clinic
Secondary School
Library

CLUSTER 2

Family Doctor
Clinic
Dental Facility
Pharmacy

CLUSTER 4

Convenience Shops
Pharmacy
Clinic
Wife's Workplace
Bingo Hall
Tennis Court

CLUSTER 3

Church
Community Centre
Library
Convenience Shops
Clubs/Societies

CLUSTER 5

Shopping Centre
Restaurant
Movies
Bank
Wife's Workplace

CLUSTER 5 CONT'D.

Husband's Workplace
Siblings' Workplace
Pharmacy
Market
Bowling Alley

CLUSTER 6

- Restaurant
- Movies
- Museum
- Theatre
- Bowling Alley
- University
- Art Gallery

CLUSTER 7

- Workplaces
- Bank
- Restaurant
- Sports Arena
- Bowling Alley

CLUSTER 8

- Park/Play Area
- Tennis Court
- Swimming Pool
- Sports Arena

CLUSTER 9

- Cottage
- Golf Course
- Sailing Base
- Skiing Resort
- Restaurant

CLUSTER 10

- Golf Course
- Restaurant
- Tennis Court
- Provincial Park
- Zoo
- Clubs/Societies

CLUSTER 11

Night Club

Dancing

Restaurant

CLUSTER 12

Federal Ministry

Provincial Ministry

Regional Government

CLUSTER 14

Hospital

Clinic

Dental Facility

Family Doctor

Pharmacy

Restaurant

Convenience Shops

Wife's Workplace

Daycare/Nursery

CLUSTER 13

Skating

Restaurant

CLUSTER 15

City Hall

Restaurant

Convenience Shops

Daycare/Nursery

GA:agb-2

D2D045

SECTION 4

POSSIBLE 1992 PATTERNS OF ENERGY USE

HOW TO ASK QUESTIONS ABOUT THE FUTURE

As stated in the Introduction, the basic assumption of this study is that an analysis of lifestyles prevailing in a city is an essential first step to planning the location and allocation of facilities, in patterns which will help people minimize car travel and save energy. In the preceding sections, the identification of existing lifestyles and travel patterns to various facilities was comparatively simple and straightforward, because people were asked to describe their movements at present and in the immediate past. In order to plan a city and the distribution of its various facilities, however, considerable foresight and a thorough understanding of future trends are essential. This section of the report will therefore deal with the problem of how to ask people about their movements in the future and obtain realistic answers which could serve as the basis for the location and allocation of facilities in a city.

SCENARIA IN ENERGY SHORTFALL: 1982-1992

The first step in this process was the formulation of scenaria in energy shortfall in gradual steps, in order to make the transition from conditions in 1982 to 1992 as realistic as possible. In order to make these conditions relevant to changes in all aspects of human life in the city - rather than to a shortfall in energy alone - it was decided to formulate scenaria in the following topics: -

- Demography, Society, Participation, Government;
- Energy, Economics, Information, Transportation;
- Urban structure, Housing, Commerce, Industry, Pollution;
- Built environment, Countryside, Recreation, Tourism.

The geographical context, in view of this wide range of topics could only be regional and it was therefore decided to set up a seminar or symposium of specialists invited from various tiers of government and private enterprise in the Ottawa region. This symposium took place on Monday, February 7, 1983, and a report of the proceedings will be found in a separate volume under the title:

SYMPOSIUM ON ENERGY, ENVIRONMENT
AND LIFESTYLES IN THE OTTAWA REGION: 1982-1992

The outcome of the symposium was a set of projections in three phases: 1983-85; 1986-88; and 1989-92. The objective of phased projections in such a variety of topics for the Ottawa region was to obtain a realistic yet evolving image of the future in the area. (In) "Evolutionary futurism (it) is essential to understand... patterns of transformation, the creation of whole systems, the invention of new capacities, so that we envision and act to create a positive future, commensurate with the full range of human potentials" (Hubbard, 1983). In a survey of future movements between various urban facilities, this approach would help to place the respondent in a position to provide realistic answers rather than wishful guesswork. Moreover, the incorporation of indirect or numerical checks on some of his responses, would ensure that answers were indeed a true expression of the respondent's choices and decisions in the face of particular situations, offering him a number of options. The evolving image of the Ottawa region may be illustrated with a summary table of all projections put forward at the symposium, arranged in the form of scenaria, as shown on Table 11.

TABLE 11: SUMMARY OF PROJECTIONS FOR THE OTTAWA REGION: 1982 - 1992

A.	1982 - 1985 PERIOD
Population:	- Continued decrease in household size from 1981 average of 2.7, but at slower pace; - Just over 50% of the annual increase of 7,450 persons is likely to be due to migration and employment growth, while the rest is likely to be due to natural increase; - Ottawa population is expected to be 304,000 to 309,000 in this period, while the National Capital Region reaches 725,000 to 745,000 people.
Housing:	- Owner-occupied homes to rise by 10%; - Supply to be moderate; occasionally even plentiful, due to flare-ups in sub-markets; - Rental market to become less affordable with 8%-10% increase in rents; - Vacancy rates between 0.5% and 1.5%; - High maintenance costs particularly in energy; - Illegal conversions to higher density likely to continue; - Existing public housing stock badly in need of rehabilitation and retrofitting.
Society Participation Informatics:	- Trends towards sharing information with the public; - Electronic means allow people more choice, more pass-times, more outlets; - Working at home experimented with - employers hesitant; - Computers added to most business and residential premises.
Energy:	- Stable prices for oil at the level of $36.00 to $40.00 per barrel;

	- At the gas pump, prices fluctuate between 30¢ and 56¢ per litre due to competition between suppliers; - Dilemma for Canada whether to continue development of local oil resource industry towards self-reliance for the nation by 1990, or to import cheap foreign oil to increase reserves; - Natural gas in plentiful supply but price kept at 65% of oil; - Electricity supply transmission from Ontario Hydro to Ottawa Hydro in critical juncture, as Environmental Assessment Board takes time to decide whether to allow transmission lines -- decision expected by 1985-86. Nuclear debate grows; - Growing interest, but low reliance on renewable energies.
Urban Form and Structure:	- (No projections possible for periods 1983-85 and 1986-88; See forecast to 1992).
Commercial Development:	- (As above).
Economics:	- Firm establishment of 'High Tech' industry; - Continuing generation of new jobs in that industry. Ottawa fares better than nation in employment; - In Central-City and Inner-City areas, revitalization to continue; - Inflation: 6%-8%; Interest rates: 11%-13%.
Rapid Transit:	- Sections of Transitway (Mann Avenue to Riverside Drive and Carling Avenue to Algonquin College) to be operational by late 1983; - Construction of Scott Street section to be operational by 1985;

- Projection of continued increase in ridership on public transit; Current level: 175 trips per head of population;
- Albert Street to become a Transit Mall in 1984 with stations at Elgin, O'Connor, Metcalfe, Bank and Kent;
- Construction of east Transitway, (Riverside Drive to St. Laurent) to start in 1984.

Recreation and Tourism:

- International travel and tourism may continue to decline;
- Emphasis on regional scale of recreation and tourism;
- Cottage: "here to stay";
- Less emphasis on organized activity;
- More family-oriented recreational pursuits;
- Ottawa tourism: 2 million/annum with some 660,000 from outside the region;
- Increase by about 2.0% per annum and likely to rise;
- WINTERLUDE and SPRING FESTIVAL expected to grow;
- Rideau Centre including Conference Centre become fully operational and exert attraction.

Pollution:

- Pollution control strategy being developed for rivers in the area;
- Alternative swimming locations to Rideau River seriously being considered - Gatineau, Rideau Lakes, etc.;
- Mooney's Bay and Britannia to continue as swimming beaches, subject to occasional control or warnings;
- Quebec municipalities expected to start operating sewer treatment systems;
- Along Rideau River, heavy metal levels are below detection level;
- Increase in density of urban population not likely to produce unsurmountable pollution problems.

Social Planning:

- Greater attention to special need and minority population groups;
- 1976-1981 trend towards single-parent families dramatically increasing;
- Single-person households already a growing proportion of the population, may continue to increase;
- Elderly persons also in growing proportion will continue to increase;
- Monitoring system with 100 indicators for 30 'need areas' currently applied by the Ottawa-Carleton Social Planning Council;
- Retraining opportunities in computation and data management also being organized.

B.	1986 - 1988 PERIOD
Population:	- Continued decrease in household size; - Slight increase in rate of in-migration; - Ottawa population may reach 307,000 to 312,000, while the National Capital Region reaches 775,000-795,000 people.
Housing:	- Owner-occupied homes to rise by 6%; - Supply to be moderate to poor; - Rental market continues to be less affordable with about 8% increase in rents; - Vacancy rates vary between 1.0% and 2.0%; - Maintenance costs remain high as energy becomes more expensive; - Moderate escalation in property values; - Improvements in housing renovation and retrofitting technology.
Society Participation Informatics:	- Computer becomes controller of other appliances; - Working at home begins to grow; - Teleconferencing replaces travel between cities, increasingly; - Educational software issued to students for home learning; - Data bases on products, services, etc. accessible at home through computer.
Energy:	- Rising prices for oil between $49.00 and $50.00 per barrel; - At the gas pump, prices fluctuate between 50¢ and 76¢ per litre;

	- Natural gas and electricity also rise at the rate of 10% to 18% per year. Nuclear controversy continues; - Electricity supplies now quite adequate in the region, due to erection of transmission lines by Ontario Hydro; - Growing reliance on renewable energies and passive solar in particular.
Urban Form and Structure:	- (See forecast to 1992).
Commercial Development:	- (As above).
Economics:	- Some decline of recovery trends; - Revitalization of Ottawa downtown and inner suburbs continues; - Inflation: 8%-10%; Unemployment rises to 8% or 9%; Interest rates: 13%-15%.
Transportation:	- (See forecast to 1992); - Renovation of Queensway, including eastern extension may be completed.
Rapid Transit:	- East Transitway to Blair Road completed; - Southeast Transitway between Hurdman Station and Hunt Club Road to start construction in 1985; - Considerable increase in ridership on the growing system; - Projected level: 190-200 trips per head of population.

Recreation and Tourism:	- International travel may decline further due to rising energy prices; - Trend in family-oriented pursuits tends to grow; - New Art Gallery and Museum of Man (Laurier Park in Hull) completed; - Tourism projected to increase by 2.5% to 3.0%.
Pollution:	- Pollution control strategy now operational; - Some noticeable improvement in pollution levels of Ottawa and Rideau Rivers.
Social Planning:	- Continued growth of single-parent and single-person households; - Slight increase in unemployment creates more problems and opportunities for retraining.

C.	1989 - 1992 PERIOD
Population:	- Smaller decrease in household size appears likely; - Ottawa population may reach 310,000 to 315,000, while National Capital Region reaches 818,000 to 837,000; - Annual growth rates over the long-term (1981-2000) may vary as much as 0.8% per annum, hovering between 0.9% and 1.7% - i.e., between 5,000 and 10,000 persons/annum.
Housing:	- Owner-occupied homes projected to be in short supply at only 4% increases; - Rental market also limited as vacancy rates are expected to be only around 1.0%. Rent controls keep increases to only 6% - no new construction of rental units likely; - Maintenance costs still rather high as energy prices are stable to rising; - Investment in housing at minimal level. Higher density, moderately priced housing, smaller units, much in demand. Lot sizes shrink considerably; - Zoning barricades between high and low density homes, due to political pressure; - Property redevelopment spreads to suburban areas; - More incentives to tenants to be energy-conscious; - Financial incentives for rehabilitation likely to be continued to 1992 and beyond; - More co-operative forms of housing to increase; - Greater emphasis on modular construction and building technique improvements for all types of dwellings.
Society Participation Informatics:	- Data bases offered as collective services; - Telecommunications encourage trends from social networking to televoting; - Electronic realities begin to replace physical realities;

- Home-orientation in economic activity tends to increase feelings of isolation;
- Idea of 'privacy' evolves from spatial sense to information terms;
- Participatory processes evolve fully toward information sharing;
- Emphasis on pluralism and away from seeking a consensus to satisfy majorities.

Energy:

- Stable to rising prices for oil hover between $50.00 and $65.00 per barrel;
- At the gas pump: 80¢ - $1.12 per litre;
- Natural gas and electricity which were at about equal price levels in 1990 (according to Ontario Hydro projections) now may diverge, with natural gas becoming more expensive by 1992;
- Renewable energies expected to rise considerably in demand and supply, as technologies related to them receive increasing government assistance;
- Energy price levels emphasize social and income differences between various lifestyles.

Urban Form and Structure:

- Not many changes in form as 90% of the projected 1992 total urban area is already in place;
- Some 2,300 to 5,800 hectares of new urban development is projected in the Ottawa-Carleton Region to accommodate 40,000 to 90,000 people, taking up some 18,000 to 47,000 new jobs and creating some 35,000 to 53,000 new households;
- Mixed-use development complexes increasingly in evidence, because of advantages in ease of access and convenience, particularly at transit stations;
- More housing units will be required to accommodate smaller households in higher densities;
- Single-family, low-density housing to demand high premium;

- Water and sewer services together with road construction are likely to become a political issue, because they are very costly to supply in the extended urban areas;
- Some nodes along the Transitway - e.g., Eastgate, St. Laurent Shopping Centre, Billings Bridge and South Keys - are likely to become important district centres with high density, mixed development around the transit station.

Commercial Development:

- No significant deviation in federal government policy on civil service employment and decentralization expected;
- Headquarters of some organizations - e.g., Red Cross - may be increasingly attracted to Ottawa;
- Regional shopping centres will continue to attract people, rather than being exchanged with 'computer shopping';
- Office accommodation may grow between 500,000 and 600,000 sq. ft. per year, but not necessarily downtown. New complexes - e.g., Confederation Heights, Tunney's Pasture, etc. - may come about partly through federal government initiative and partly by private enterprise finding new opportunities near shopping centres - e.g., Pinecrest.

Economics:

- Sub-clustering of employment centres in various nodes throughout the Region appears likely, with the downtown area retaining its dominance;
- No massive suburban residential growth, but considerable Inner-City revitalization to continue;
- Inflation rates: 5%-7%; Unemployment rates: 10%-12%; Interest rates: 12%-14%;
- Recessionary period with usage and price controls or other forms of joint economic management.

Transportation:

- Telecommunication to be a complement rather than a substitute for transportation;
- More recreational, shopping and personal travel in proportion to total trips;

- Trip length may increase as the size of the urbanized area grows during the decade;
- Increase in overall trips (in absolute terms) in relation to 1982;
- No congestion level traffic foreseen on the future Ottawa-Carleton road network, by virtue of Transportation System Management actions. Western Boundary Road and Highway 416 to be under construction.

Rapid Transit:

- Entire 30 km length of Transitway is expected to be operational by the early 1990's extending from Woodroffe Avenue in the west to Blair Road in the east and to Hunt Club Road in southeast;
- Projected ridership level: 220 trips per head of population (30%-40% of peak traffic);
- Total investment: $185 m (in 1983 values);
- Total fleet: 750 vehicles.

Recreation and Tourism:

- Ottawa's emphasis on sense of tradition and place is likely to be increasingly appreciated by tourists;
- Retired population increase in proportion to total population (9% in 1983, expected to rise to 11% or 12% by 2015) is expected to have a significant impact on tourism and recreation in Ottawa;
- Day trip recreational outlets in the region increasingly in demand;
- Recreational facilities to be included in private residential (including high rise) development at an increasing scale;
- Sharing of space in facilities for a variety of recreational, entertainment and social activities;
- Recreation to be seen as a means towards self-development and self-fulfillment;
- Significant input in downtown area for visitor attraction;

- "Mile of History" promenade;
- Considerable revenue likely from "tourist dollar".

Pollution:

- Ottawa and Rideau Rivers could be significantly cleaner by 1992 (despite increase in urbanization) due to pollution control measures.

Social Planning:

- More services likely to be created for the elderly and the disadvantaged;
- Retraining services also likely to be extended and expanded as unemployment increases and "high-tech" jobs increase;
- Attention to needs of underprivileged minorities (e.g., female-led households) likely to increase;
- Other lifestyle groups in need of greater care by the late 1980's may include:-
  - The handicapped (physically and mentally);
  - The institutionalized;
  - Less mobile section of population;
  - Low-income groups;
  - The elderly.

GA:baw-3
D2D110

NOTE ON TABLE 11

The preceding Table indicates that there was a broad consensus as to development prospects for the National Capital by 1992. The only controversies to arise during the Symposium were as follows:

(a) whether computers were likely to change current patterns of shopping and commuting to work;

(b) whether the private car was likely to be used less frequently with the advent of videotext.

Both of these could be resolved during the proposed survey, in accordance with the actual behaviour of respondents.

The only factor of uncertainty which was likely to produce considerable variation in lifestyles was in energy prospects.

It is therefore proposed to adopt scenarios only in energy availability and the effect of this decision will be to neutralize all other factors of variability in order to arrive at an independent assessment of its effects.

Assumptions will coincide with the Ministry of Energy projections of oil prices to 1992, as given on p. 18 in Section 1 (summarized on Table 11 under all Energy sub-headings). Moreover, figures will be rounded-off to make them more memorable for the survey respondent. The 1985 price of gasoline for example, being 128% of the 1982 price, will be rounded-off to 130%. In order to make it more comprehensible, it will be presented as a suggested "30% reduction in your 1982 annual car mileage, to avoid any extra expenditure for the household." Similarly, the 1988 gasoline price of 169% of the 1982 price, will be interpreted as a 70% reduction of the annual 1982 mileage.

GA:baw-2
D6D061

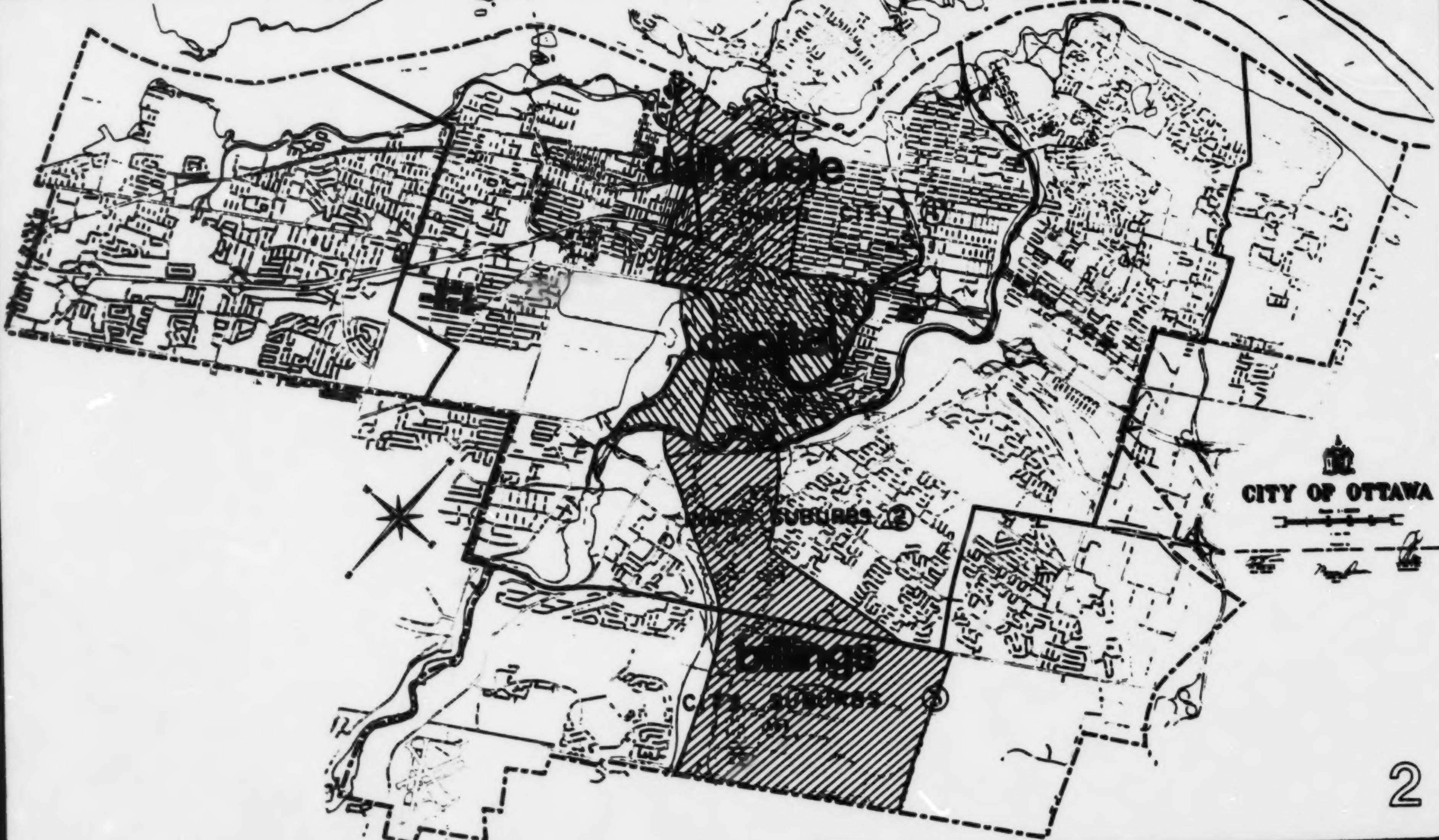
THE OTTAWA ENERGY BUDGETS GAME

In view of the large and varied amount of information necessary to provide a realistic, yet evolving image of the future in the Ottawa region, the following decisions were taken for the conduct of a survey:-

1. The survey objectives and method should be comprehensible and accessible to people of all walks of life in the City;
2. The complexity and variety of projections to produce an evolving future image for the Ottawa region should be conveyed by means of visual aids and drawings, rather than text;
3. The options available to the respondent when confronted with a decision he is expected to reach should be clearly visible to him in pictorial rather than textual form;
4. Checks on the reliability of a decision should be possible by quantitative means to be used after, but not during the interview;
5. Numeracy should not be an essential condition for participation in the survey. Interviewers should be able to use calculators to supply quantitative information to the respondent without delay, to allow him to reach decisions as soon as possible;
6. Although there should be no doubt in the respondent's mind about the serious purpose of the survey, the proceedings should be relaxed and enjoyable, rather than making him self-conscious;
7. The duration of the interview should depend to a large extent on the respondent, rather than imposing heavily on his time.

The survey designed in view of the above considerations consists of a questionnaire and a simulation game, which are shown in Appendix 3 in the APPENDICES volume. The simulation game is briefly described on the front cover of this report under the title:

THE OTTAWA ENERGY BUDGETS GAME


CITY OF OTTAWA
Dalhousie
CITY ①
SUBURBS ②
C
SUBURBS ③

2

CONDUCT OF THE SURVEY

The selection of a simulation game as a survey method on a matter likely to affect all lifestyles - i.e., the use of energy - had implications for every aspect of its conduct, which may be summarised as follows: -

i. Sample Selection: A smaller and geographically more restricted sample was selected, in comparison with the City-wide sample of 2,000 households approached for the "Survey of Energy Use and Household Trips in 1982". This decision was based on the following facts:

(a) A survey based on a game needs to be monitored by an interviewer and it is likely to be prohibitively expensive for a large sample;

(b) No Factor Analysis would be required with the data obtained, because the principal factors underlying Energy Use had already been established - see tables in Section 2 - and the main objective of the Budgets Game was to establish Land-Use Patterns;

(c) The geographical location factor in energy use had already been established in the 1982 survey and rather than going to a full Inner City (Zone 1), Inner Suburb (Zone 2) and City Suburb (Zone 3) sample, a partial sample of each of these zones would be satisfactory. The contiguous wards of Dalhousie, Capital and Billings - see Map 2 - were therefore selected for this purpose and the standard error for a sample of 500 households was calculated as follows: -

Number of households in selected wards (1981 Census information)

= Dalhousie (8,862) + Capital (7,193) + Billings (6,846)

= 22,901 households

Using the formula for the "Standard Error of a Sampling Distribution of 2 proportions" shown on p. 39 where:

'p' = 500 or 0.5 thousand

'q' = 22,401 (total less 500) or 22.401 thousands

'n' = 22,901 (total) or 22.901 thousands

$$\text{Standard Error} = \sqrt{0.5 \times 22.401/22.901}$$

$$= \pm\ 0.699,\ \text{say},\ \pm\ 0.7$$

This margin of accuracy was considered satisfactory.

ii. Engagement and Training of Interviewers:

In view of the particular requirements of a survey based on a quantitative simulation game - explanation of procedure in simple terms, exposition of options available at every juncture, use of calculator, awareness of public relations aspects of the survey, etc. - it was decided to engage and train 20 students of sociology, psychology, communication, education, recreology, statistics, economy, urban planning and architecture from the two universities of the City - Ottawa and Carleton. Each training session - about 90 minutes - was followed by a trial interview with a student's friend or relation and advice on various problems encountered. Feedback received from this pilot survey resulted in slight modifications and a streamlining of simulation procedure, to culminate at the version of the Ottawa Energy Budgets Game shown in Appendix 3.

iii. Communications and Opportunity for Public Participation: In order to prepare the public for the survey and pave the way for the welcome of interviewers to every home, the announcement shown on the front cover of this report was published in THE CITIZEN and LE DROIT, on three occasions, to coincide with weekends - the most productive part of the week for a survey based on a game. The response from the public was most encouraging and helped to complement the selected sample of homes, in order to approximate the City's 1981 household structure, as follows: -

Table 12: 1981 HOUSEHOLD STRUCTURE OF THE CITY, COMPARED WITH THE STRUCTURE OF HOUSEHOLDS RESPONDING TO THE OTTAWA ENERGY BUDGETS GAME (1983)

Household Size	% in City (1981)	% in Survey Response (1983)
1-person	33.8	36.8
2-person	31.3	20.7
3-person	14.5	14.6
4- & 5-person	17.4	24.7
6 persons & over	3.0	3.2
TOTAL	(100.0)	(100.0)

The divergence in the case of 2-person and 4- & 5-person households may be explained by the following facts: -

(a) A total of 63 households in the response were found to live in combinations of 2 or 3, occupying the same house - e.g., 3 batchelors in the same apartment, or sibling and spouse living with parents. While in the case of the 1981 Census these might pass as one large household, in the case of a survey related to lifestyles, they had to be counted as separate households. This tended to inflate the proportion of 1 - person and deflate the proportion of larger households;

(b) As employment between 1981 and 1983 increased in the City of Ottawa, some distortion towards the smaller households could be expected in a survey carried out in 1983.

(c) When a total of 121,705 households in the City are to be represented by a sample of 500 - of which 306 respond - some divergence in household structure might well be expected.

A second important test in sorting out valid responses was the check for even geographical distribution over the sample area, which, as mentioned in Section 2 indicated the following desirable ratio of responses from each zone (Map 1): -

Zone	Proportion		Actual No.
Inner City	1.0		82
Inner Suburbs	1.0		89
City Suburbs	1.5		135
		TOTAL	306

The slight divergence may be due to the population of the sample area zones (Map 2) being different in its distribution by comparison to the City population as a whole.

The total of 306 responding households in relation to the sample of 500 which were approached, gives a very high ratio of 61.2%. This ratio proves an important benefit of extending participation to the public at large - i.e., complementing the response from the selected sample with voluntary respondents, towards meeting a control variable - in this case, the household structure of the entire City. The second important benefit is of course, in the field of public relations between a municipal council and the community at large.

Good management of these four aspects of the conduct of the Ottawa Energy Budgets Game survey - i.e., sample selection, engagement and training of interviewers, communication with the public through newspaper announcements and opportunity for public participation - ensured a very high response at a very reasonable cost. Less than 200 interviews had to be paid for, (i.e., an overage of 10 interviews per student) as the rest came from volunteer respondents.

ANALYSIS OF DATA

The assembled responses were codified by five students and mathematically analyzed by processing at the University of Ottawa's Computing Centre, to obtain the following: -

a. Frequencies of response to individual questions. This indicated that the questions on net household income, 'round trips' currently used and particularly, the question on solar energy use, had not been filled-in by all of the 306 respondents. Due allowance had to be made for these blanks in the subsequent operations;

b. Typology of 1982 lifestyles: Using the criteria obtained through the analysis presented in Section 2 and summarized in Tables 2 and 9, the 306 respondents were classified on the basis of 36 lifestyle groups, taking into account their response to questions referring to the present or the immediate past. The outcome will be discussed in Section 6.

c. Average characteristics within each lifestyle group: This was a process of averaging all numerical data provided by respondents, taking each lifestyle group at a time, as classified in (b) above. These characteristics were relied upon to reach conclusions on various aspects of the use of energy in Sections of this report.

d. Derivation of additional criteria for the classification of 1992 lifestyles: This was based on a close examination of all items of information in a response, referring to 1983-85; 1986-88; and 1989-92. The following additional criteria were derived: -

   i. Inventions "purchased": Highly educated households, regardless of lifestyle group, tended to be more receptive to the foreseeable inventions incorporated in the Ottawa Energy Budgets Game;

   ii. Choice in mode of transport: In order to meet the limit of available gasoline car kmileage, a well-off 'conserver' household would not hesitate to use a tricycle for shopping. The willingness to diversify transport modes away from the gasoline car may therefore be regarded as an additional criterion for a 1992 classification of lifestyles, in the use of energy.

   iii. More and longer chains of facilities in multi-purpose trips: The trips suggested by middle and advanced age households with highly educated members and a 'conserver' orientation, tended to consist of more and longer chains of facilities. A 'chain of facilities' is simply a set visited one after the other as part of a round trip.

iv. Perseverence in trying to meet and even stay below the limit of kmileage suggested for various periods in the Energy Budgets Game. These limits were based on the increase of gasoline costs forecast for 1985 and 1988 and if a respondent exceeded them, he or she had to pay for the additional gasoline used at the price current in each period. Some households were so successful in staying below the limit that they consistently earned the privilege of incorporating a new or invented facility in their lifestyle - see Instructions for the Energy Budgets Game in Appendix 3.

v. Ability or aptitude to benefit from financial incentives available for renovating and retrofitting a home. This was incorporated by the use of a special list of grants (CHIP, COSP, etc.) in the Budgets Game - see APPENDICES Volume, Appendix 3.

e. Typology of 1992 Lifestyles: Continuing the analysis, these five additional criteria - inventions "purchased"; choice in mode of transport; more and longer chains of multi-purpose trips; perseverence to met kmileage limits; and ability to benefit from renovation incentives - were added to the list of 'conserver' household characteristics in Table 2, to obtain a 1992 classification of households, as shown in Section 6. It is important to emphasize that this classification would be valid only if the assumptions accompanying the Energy Budgets Game became a reality.

f. Linkage Analysis: The 'round trips' currently used by a household, the pairs of facilities convenient to use together, and the multi-purpose trips devised during the Energy Budgets Game were all analysed separately, as shown on Diags 10-20. A method of 'cumulative assessment of linkage intensity' had to be devised, as explained in Diag. 10.

It may therefore be concluded that the analysis of data produced results on all four aspects of this project: - (a) Lifestyles in 1982 and 1992; (b) Energy consumption patterns; (c) Travel behaviour; and (d) Land-use patterns.

POSSIBLE 1992 PATTERNS OF ENERGY USE

Among the above-mentioned four aspects of this project, energy consumption patterns may be regarded as the generator of change in travel behaviour, lifestyles and land-use patterns in the service of lifestyles. It is therefore proposed to summarize energy consumption patterns in this Section, in order to concentrate on lifestyle travel behaviour changes in Section 5, lifestyles in Section 6 and culminate with land-use patterns - the ultimate objective of this project - in Section 7.

Tables in Appendix 6 inserted in the APPENDICES volume show the collection of average energy consumption and car travel figures for various lifestyle groups, which have been summarized on Table 17. The general trends shown by this Table may be summarized as follows: -

a. Diversification from oil for heating purposes, but not altogether for transportation purposes. It appears that some types of car will continue to depend on gasoline, according to a number of 'frivolous' households which continued to use their present car, or a replacement, without bothering to convert to any other type of fuel.

b. Increase in the use of passive solar and some growth in the use of active solar energy. The electric car was particularly popular by the end of the study period (see Table 15), with a total of 12.0% of the respondents opting to "buy" such a car at some time after 1989, at a cost of no less than $18,000 (estimated value in 1990 dollars). A solar battery recharger was "purchased" by 1.1% of respondents, but an ordinary electric generator was the more popular choice at 4.1% because it was cheaper. Active solar collectors were increasingly popular throughout the study period, with a total of 12.0% of all respondents "purchasing" at the price of $3,000 current dollars.

c. Hydrogen conversion of cars will be increasingly popular after 1986 when it has been estimated to cost $3,600 in 1986 values. A total of 9.9% of the respondents opted for such conversion during the study period. Propane and liquid natural gas conversions were not offered as 'inventions', but respondents were free to select them as ways of minimizing expenditure on travel. Their contribution to diversification from oil until the arrival of hydrogen by 1986-88 should not therefore be underestimated.

d. Manpower in riding the bicycle, or tricycle (selected by 8.4% of respondents) or just walking or skating was a significant contributor to the effort in overcoming energy shortfall restrictions on car mileage. The limitation in the use of these means of travel in favourable weather alone was accounted for in the simulation game by offering a set of WEATHER FACTOR cards to the respondents. The proportion of various types of weather in these cards was similar to the annual averages in Ottawa, according to the publication THE CLIMATE OF OTTAWA-HULL by R.B. Crowe (1982) published by Environment Canada.

   The recreational and health value of travel dependent on manpower as an antidote to the isolation likely to be felt in the work-home environment of the late 1980's, should not be underestimated. Physical activity and the quest for fresh air and social contact are likely to be important ingredients of this antidote and as the nationally exceptional number of physically-fit Ottawans know, they can easily be obtained through walking, running, skating and cycling.

e. Computer power, through the most recent and foreseeable developments in graphic and textual data by telecommunication onto the home TV screen, promises enormous savings in transportation energy. As already indicated, TELIDON was "purchased" by no less than 21.7% of all respondents and thereafter used effectively to save kmileage by substituting journeys for a wide range of purposes with telecommunication.

The travel behaviour, lifestyle and land-use implications of the foreseeable change in energy use, will form the subject of Sections 5, 6 and 7.

SECTION 5

FORESEEABLE TRAVEL PATTERNS: 1982-1992

A dominant theme throughout the Ottawa Energy Budgets Game was the growing shortage of energy during the decade under study and the objective of the entire simulation was to observe and record the effect on the travel pattern of households representing various walks of life in the sample areas. The projected shortage was reflected in the kmileage limits suggested to the respondents for each period of the Game - i.e., about 70% of the 1982 kmileage for the period 1983-85; about 30% of the 1982 kmileage for the period 1986-88; and if possible, use no gasoline car in the period 1989-92. The suggested percentages refleted the energy prices projected for these periods, in relation to 1982 prices - see Section 1. The limits were not mandatory and many respondents - particularly the ones unwilling to conserve - chose to pay the projected high gasoline prices appropriate to the period of the Game. Others chose to diversify their means of transport away from gasoline and the selection of all Transportation Options in each period is shown on Table 13.

DIVERSIFICATION OF TRANSPORT MODES

The main trend throughout the study decade, as shown on Table 13, was the progressive growth in popularity of all modes except the gasoline car. As this was the stated object of the Game in the newspaper announcement, the respondents may be said to have been influenced in this trend, but if the assumptions and projections on which the Game is based became a reality, official announcements and encouragement to save gasoline would only be welcome by people. This type of survey is valuable as a means of gaining insight into value systems in relation to transportation.

Table 13: TRANSPORT MODE OPTIONS SELECTED BY THE RESPONDENTS DURING THE ENERGY BUDGETS GAME, 1982-1992

TRANSPORT MODE OPTION	% OF RESPONDENTS SELECTING OPTION IN:				Popularity rank
	1983-85	1986-88	1989-92	1982-92 Total	
01 Gasoline car	100.0	68.0	8.5	176.5	(2)
02 Reduce visits	5.3	18.0	31.5	54.8	(11)
03 Multi-purpose trip	76.1	92.4	98.0	266.5	(1)
04 Walk	8.9	19.6	28.8	57.3	(10)
05 Take the bus	19.6	33.5	62.0	105.1	(4)
06 Propane car	28.1	30.3	19.1	77.5	(8)
07 Hydrogen car	(N/A)	4.5	5.4	9.9	(16)
08 Take a taxi	--	1.0	3.1	4.1	(18)
09 Go by limousine	--	0.2	3.0	3.2	(20)
10 Substitute at home	--	0.5	14.9	15.4	(14)
11 Use motorcycle	9.6	10.9	12.1	32.6	(12)
12 Telecom's/TELIDON	17.0	48.2	89.7	154.9	(3)
13 New job (closer)	--	2.1	3.4	5.5	(17)
14 Move home closer	--	0.2	0.8	1.0	(22)
15 Work at home	2.1	20.9	44.0	67.0	(9)
16 Give up activity	--	0.3	3.1	3.4	(19)
17 Bicycle/Tricycle	14.5	26.1	60.5	101.2	(6)
18 Car in winter only	28.6	32.1	39.4	100.0	(7)
19 Skating	--	0.6	1.2	1.8	(21)
20 Join car-pool	3.2	8.9	17.4	29.5	(13)
21 Take rapid transit	1.4	19.6	82.4	103.4	(5)
22 Electric car	(N/A)	1.2	10.8	12.0	(15)

NOTE: As respondents were free to combine options - e.g., a multi-purpose trip by bicycle - the total percentages in columns and rows add to more than 100.0, but they indicate the relative popularity of various modes.

COMMENT: Multi-purpose trips by respondents no matter which mode of transport had been selected, became increasingly the way to save energy and money throughout the study period. Even during the last three years of the decade, when the TELIDON could be used for a great variety of purposes, respondents continued to rely on multi-purpose trips in all their outings. Some highly resilient respondents selected the mode according to distance, purpose, time and weather conditions of the trip, as simulated by the choice of various cards in the Ottawa Energy Budgets Game.

The trend away from the gasoline car shown on Table 13, should not be taken to indicate a fall in popularity for the private car. When the 1982-92 column figures for all types of cars are added - gasoline, propane, hydrogen and electric - the total of 275.9% is higher than the percentage total for any other transport mode. It may therefore be concluded that the private car will continue to evolve and grow in popularity. As indicated in the COMMENT under Table 13 however, its use will not be indiscriminate, but increasingly selective. The most resilient respondents opted to rationalize car usage to situations in which the distance, time and other conditions of a trip left little or no other choice, but the private car.

EXTENSION OF MULTI-PURPOSE TRIPS

The most important trend from the point of view of this project was the increase in multi-purpose trips, to the point where all but 2.0% of all respondents, adopted the idea, regardless of the mode of transport selected. Once more, it may be argued that the urban planning objective of the Energy Budgets Game, probably influenced the respondents and whether they actually used such trips in real life, remained questionable. About 1 out of 2 respondents (54%) indicated current use of multi-purpose trips in 1982-83, in response to Question 9 of the Energy Budgets questionnaire - see Appendix 3 in APPENDICES volume. This ratio however, mounted to 98% by 1992 as respondents became aware of the energy saving potential of the multi-purpose trip. It may therefore be concluded that if the built environment and the clustering of facilities in particular, could provide scope for the growth of this natural tendency to associate purposes in urban life, people will increasingly adopt the idea.

TABLE 14 : RANKING OF THE MOST POPULAR DESTINATIONS BY ANNUAL CAR KMILEAGE OF TRAVEL CAUSED TO SURVEY RESPONDENTS IN 1982

DESTINATIONS RANKED BY VALUE OF: (A X B X C X D)	NO. OF VISITORS IN 1982 (A)	% BY CAR (B)	ANNUAL TOTAL OF VISITS* (C)	AVE. NO. OF KMS TRAVEL'D (D)	TOTAL KMILEAGE TRAVELLED BY ALL RESPONDENTS (A X B X C X D)
Husband's Workplace	318	57.5	280	14.1	721,892
Shopping Centre	458	80.3	262	7.2	693,769
Restaurant	390	79.5	94	12.1	352,651
Cottage	141	97.2	38	64.5	335,914
Social Visit (1)	429	80.4	254	3.3	289,108
Wife's Workplace	206	50.5	280	9.2	267,981
Social Visit (2)	242	72.3	42	29.2	214,578
Movies	288	74.3	73	10.2	159,332
SUB-TOTAL for 8 destinations (6 types of activities)					3,035,225
Convenience Shops	372	43.5	271	3.6	157,872
Family Doctor	412	68.7	43	10.2	124,143
Bank	437	52.4	82	5.1	95,763
Swimming Pool	159	45.3	186	7.1	95,119
Church	250	71.2	52	7.8	72,197
Pharmacy	282	55.7	51	8.1	64,887
Library	249	47.0	52	7.7	46,859
Park/Play Area	219	21.9	204	3.6	35,222
Dental Facility	344	65.1	18	8.3	33,457
Theatre	205	71.7	24	9.1	32,101
Museum	176	62.5	15	12.3	20,295
Hospital	196	77.0	12	9.9	17,929
Concert	143	68.5	10	9.2	9,012
TOTAL for 21 destinations (18 types of activities)					3,840,081

$$\frac{\text{Sub-total for 6 types of activity}}{\text{Total for 18 types}} = 79.04\%$$

NOTE: *Annual total of visits has been rounded to the nearest whole number.

GA:mm-4
D2D037

REDUCTION IN FREQUENCY OF ACTIVITIES

The most painful way of curtailing travel by car was the reduction of visits to various facilities. The more distant the residential location of the respondent from downtown, the more often he had to resort to this solution. Conversely, walking to various destinations was a frequent solution for many downtown respondents and the variety of activities in their lifestyle was hardly curtailed during the Game. Equally resistant to change in this respect were the lifestyles of 'conserver' groups. The more resilient respondents among these, managed to stay below the kmileage limit suggested for a period and earn the privilege of adding new or invented facilities in their trips and thus enrich their lifestyle despite the projected energy shortage.

The activities most frequently reduced in frequency were social visits to third or fourth best friends or relations - often being replaced with long-distance telephone calls. Next were some cultural or entertainment activities, followed closely by the cottage. As the Principal Components Analysis results shown on Table 2 indicate, and as Table 14 on the next page confirms, the cottage was one of the most demanding facilities in car travel in 1982. Although some households had to reduce the frequency of their visits quite drastically - once a month for example - yet no respondent considered selling the cottage, no matter how expensive energy were to become.

RECEPTIVENESS TO NEW INVENTIONS

One of the most effective ways of reducing the cost of travel was perceived by most respondents to be the adoption or 'purchase' of foreseeable inventions. 'Purchase' meant the sacrifice of part of the estimated disposable income of the respondent in the Energy Budgets Game. Table 15 shows the selection of

Table 15: INVENTIONS OFFERED TO RESPONDENTS TO HELP THEM SAVE ENERGY, DURING THE ENERGY BUDGETS SIMULATION GAME, 1982-1992

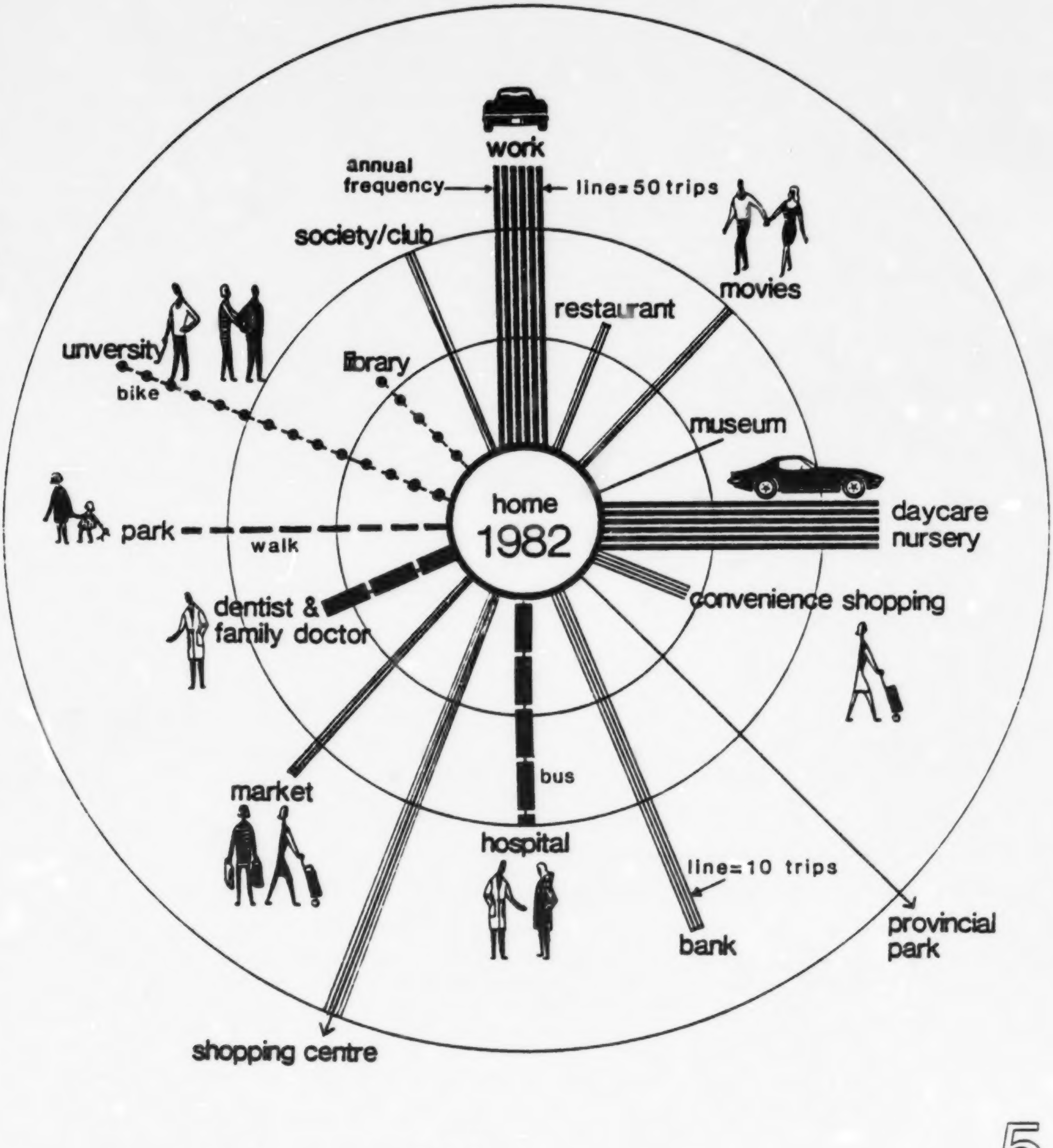
INVENTION COST & SAVINGS (C = Cost) (S = Savings)	% OF RESPONDENTS PURCHASING INVENTION, IN:				
	1983-85	1986-88	1989-92	1982-92 Total	Popularity rank
TELIDON C: $1,200 S: 60 km	(N/A)	8.2	13.5	21.7	(1)
TRICYCLE C: $150 S: 800 km	4.5	2.3	1.6	8.4	(5)
ELECTRIC CAR C: $18,000 S: Unlimited km	(N/A)	1.2	10.8	12.0	(2)
HYDROGEN CONVERSION C: $3,600 S: 50% km	(N/A)	4.5	5.4	9.9	(4)
SOLAR BATTERY RECHARGER C: $500	(N/A)	0.2	0.9	1.1	(11)
SOLAR COLLECTOR C: $3,000 S: $800	3.1	3.3	5.6	12.0	(2)
ELECTRIC GENERATOR C: $300	1.1	1.3	1.7	4.1	(10)
CAULKMOBILE C: $300 S: $200	2.5	0.9	0.8	4.2	(9)
PAY TV C: $30/month S: $10/month	3.3	1.8	0.7	5.8	(6)

MECH. ROBOTS C: $100/month S: $40/month	(N/A)	0.2	4.0	4.2	(8)
REDUCTION IN SLEEP REQUIRED (Free) S: $5/month	(N/A)	0.1	1.0	1.1	(11)
3-D TELEVISION C: $40/month S: $10/month	(N/A)	(N/A)	1.1	1.1	(11)
TWO-WAY TERMINALS C: $50/month S: $25/month	(N/A)	(N/A)	4.3	4.3	(7)
WEIGHT CONTROL (Free) S: $10/month	0.2	0.3	0.3	0.8	(12)
SYNTHETIC BLOOD (Free) S: $5/month	(N/A)	0.3	0.4	0.7	(13)
HOME MEDICAL CARE (Free) S: $20/month	3.6	3.4	3.6	10.6	(3)

NOTE: (N/A) = Invention not available at the stated period of the Game.

COMMENT: The most popular invention - the TELIDON or an equivalent videotext terminal - was usable for a great variety of telecommunication purposes as discussed in Section 6 in relation to possible effect on lifestyles. The Electric Car became more popular as its relative price decreased, due to the inflation of disposable incomes. The relation of some inventions to energy saving does not appear to have been perceived and their popularity remained low - i.e., Reduction in sleep required, Weight control (which is currently quite popular) and Synthetic Blood (which could hardly be said to be missed by healthy pedestrians or cyclists).

Conserver Lifestyle


work
annual frequency
line= 50 trips
society/club
movies
restaurant
unversity
bike
library
museum
home
1982
daycare nursery
park
walk
dentist & family doctor
convenience shopping
market
bus
hospital
line= 10 trips
bank
provincial park
shopping centre

Annual Car Kmileage 7,240

Current Multipurpose Trips

work-grocery-work

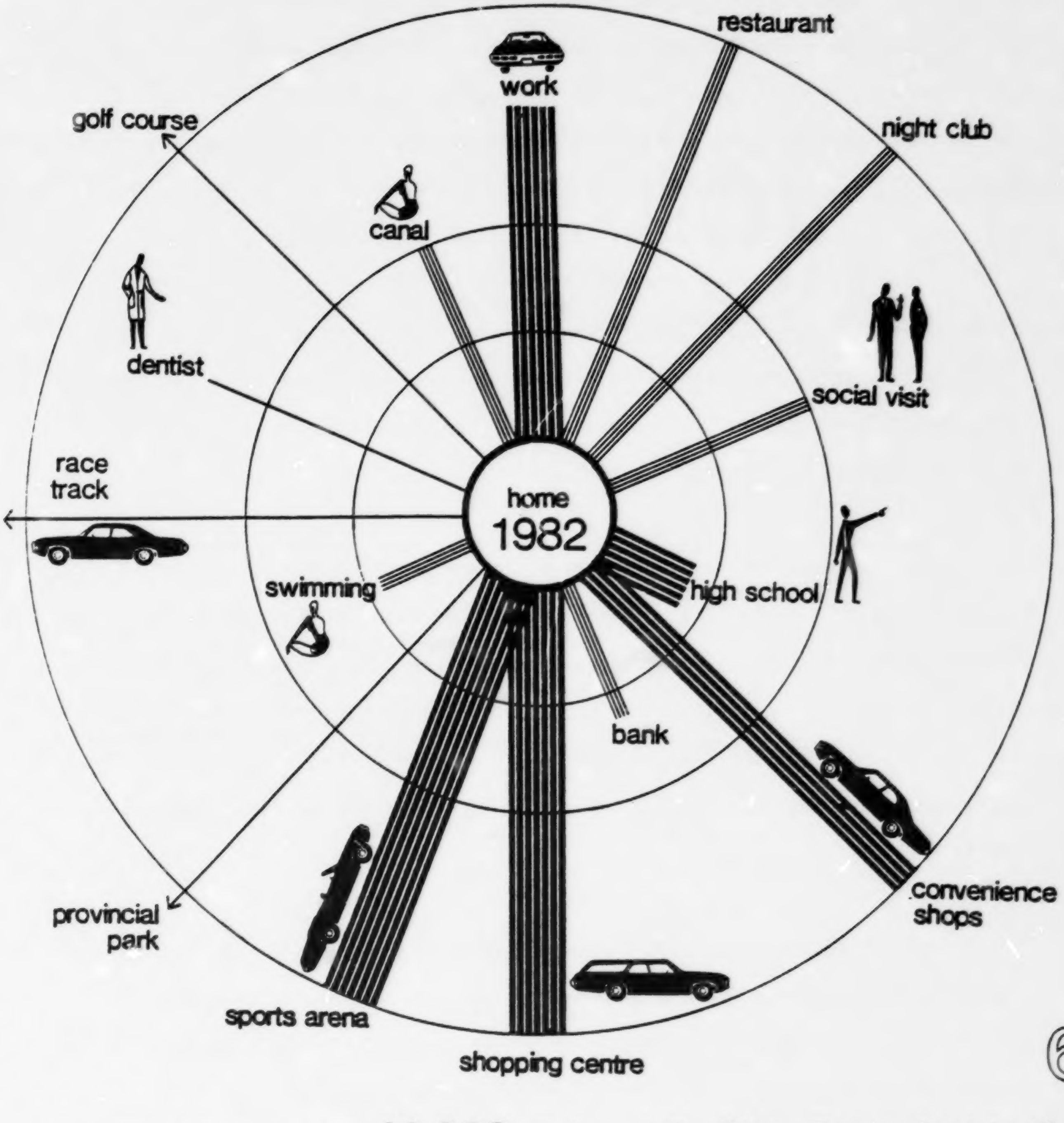
home-daycare-bank-daycare-home

Pairs of Facilities Convenient to Use: 26

1982 Expenditure on:

gasoline:	$1,120
bus:	$60
bicycle:	$6

Frivolous Lifestyle


restaurant
work
golf course
night club
canal
dentist
social visit
race track
home
1982
swimming
high school
bank
convenience shops
provincial park
sports arena
shopping centre

Annual Car Kmileage 42,929 Pairs of Facilities Convenient to Use: 9

Current Multipurpose Trips

home-restaurant-gas station-home

home-mechanical repairs-video store-home

1982 Expenditure on:

gasoline: $5,600

bus: nil

bicycle: nil

various inventions for each period and for the study decade. In general, the more educated and the higher the income of the head of a household, the more willing he or she appeared to be in the purchase of foreseeable inventions. The selection of inventions appeared to be highly related to energy savings in the case of 'resilient conservers', as already commented in Section 4. In the first rank among such inventions were the TELIDON, the conversion of a car to hydrogen, the purchase of an electric car, solar collectors, two-way terminals and home medical care by TV. The foreseeable means of transport 'purchased' by this lifestyle group were often used for multi-purpose trips, which in any case were better planned, longer and more varied as 'chains of facilities' than the trips conceived by other groups.

The contrast between the travel patterns of 'conserver' and 'frivolous' lifestyle groups is summarized on Diags. 5-9. The former have few daily car trips, a greater variety of activities near home, they spend less on gasoline, but more on the bus and possibly the bicycle. Their most important characteristic is that they have already devised convenient multi-purpose trips, making the best of existing layouts of facilities in the City, however imperfect.

The 'frivolous' groups on the other hand appear to have more than one daily car trip and they are generally more dependent on the car. Evidently they spend a great deal on gasoline and very little on public transport. They have no multi-purpose trips to speak of, although exceptions should always be respected. When these patterns of travel were compared with the patterns simulated to 1992

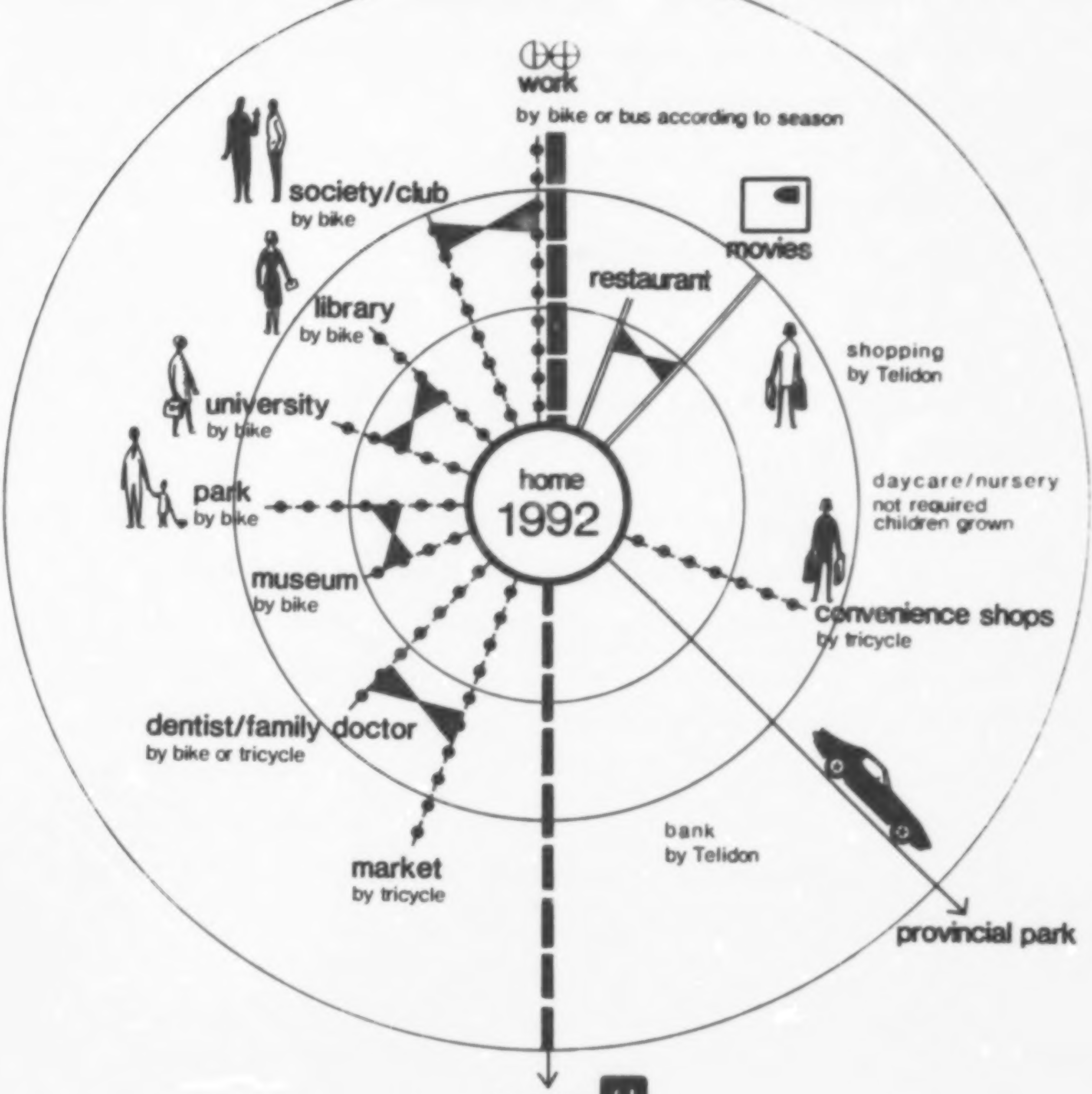
-i.e., after three iterations of the Energy Budgets Game through periods 1983-85; then 1986-88; and finally 1989-92 - the above-mentioned tendencies were found to have been accentuated as shown on Diags. 7 and 8. The 'conservers' were able to diversify from gasoline and by 'purchasing' various inventions, they succeeded in eliminating some trips without sacrificing activities. Their multi-purpose trips were longer, more varied and higher in number than the corresponding trips by 'frivolous' groups. The latter have often had to eliminate some activity, because the gasoline expense appeared to be prohibitive. Diag. 9 summarizes the travel patterns for both groups in 1982 and 1992.

Diag. 10 and its legend explain the interpretation of three types of multi-purpose trip into linkage configurations which could be useful for urban planning purposes. The multi-purpose trips interpreted were either current (1982) 'round trips' to several facilities; or pairs of facilities which the respondents suggested were convenient to use together; or simulated trips, derived during the Energy Budgets Game. Several clusters suggested by these multi-purpose trips are illustrated in Diags. 10-21 and they will be discussed in Section 6 as regards current and foreseeable impact on lifestyles and in Section 7, as regards land-use planning implications.

THE JOURNEY-TO-WORK: 1982-1992

Diag. 11 shows the linkage of workplaces with related activities - as for example, a wife's need to leave her offspring at a daycare nursery for the day, a husband's need to drive the wife to her place of work, etc. These are all

Conserver Lifestyle


work
by bike or bus according to season
society/club
by bike
movies
restaurant
library
by bike
shopping
by Telidon
university
by bike
home
1992
daycare/nursery
not required
children grown
park
by bike
museum
by bike
convenience shops
by tricycle
dentist/family doctor
by bike or tricycle
bank
by Telidon
market
by tricycle
provincial park
hospital
H

Annual Car Kmileage 340

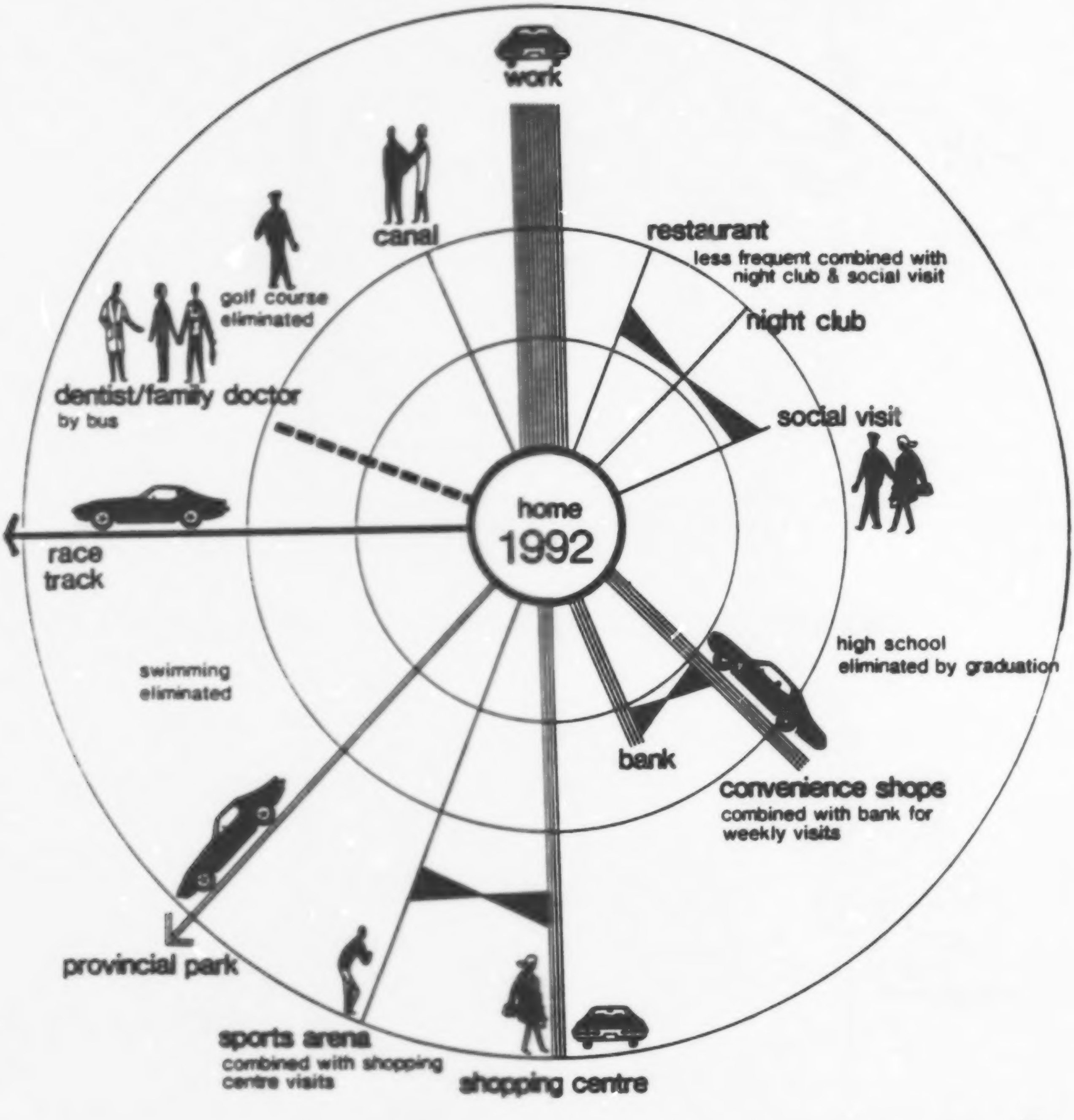
Planned Multipurpose Trips

home-university-library-home
home-work-social club-home
home-restaurant-movies-home
home-dentist/family doctor-market-home
home-museum-play park-home

Inventions Purchased

tricycle
Telidon
conversion to Hydrogen (car)
(home caulked and weatherized
in period 1983-85)

Frivolous Lifestyle


work
canal
restaurant
less frequent combined with night club & social visit
golf course eliminated
night club
dentist/family doctor
by bus
social visit
home
1992
race track
high school eliminated by graduation
swimming eliminated
bank
convenience shops
combined with bank for weekly visits
provincial park
sports arena
combined with shopping centre visits
shopping centre

8

Annual Car Kmileage 4,970

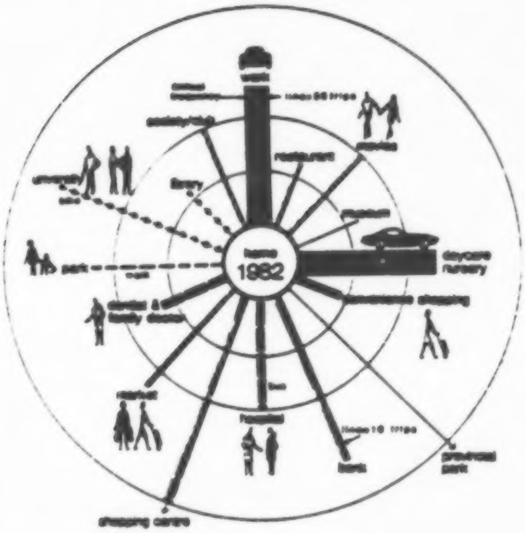
Planned Multipurpose Trips

home-sports arena-shopping centre-home
home-bank-grocery store-home
home-social visit-restaurant-night club-home

Inventions Purchased

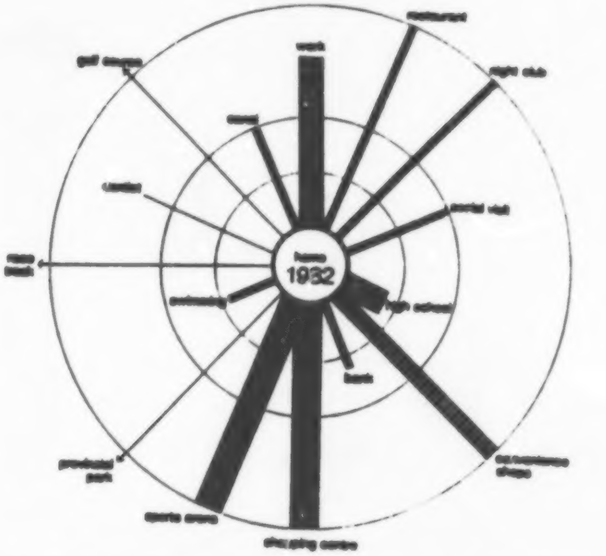
None

1982 PATTERN OF HOUSEHOLD TRIPS


Conserver Lifestyle
work
society/club
university
library
restaurant
movies
museum
daycare nursery
park
home
1982
convenience shopping
dentist & family doctor
market
bus
hospital
bank
provincial park
shopping centre

Annual Car Kmileage 7,240
Current Multipurpose Trips
work-grocery-work
home-daycare-bank-daycare-home

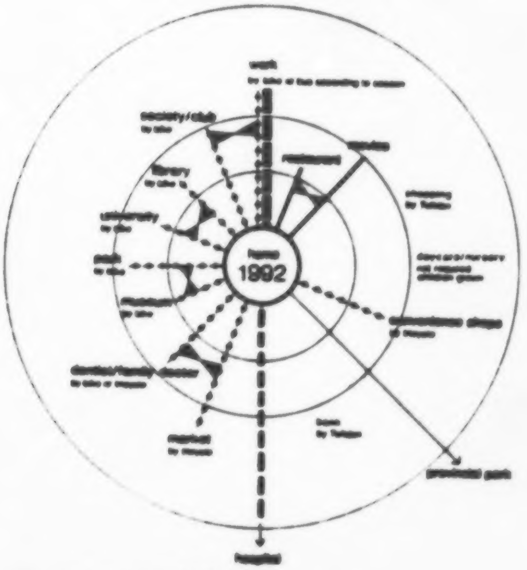
Pairs of Facilities Convenient to Use: 26
1982 Expenditure on: gasoline: $1,120
bus: $80
bicycle: $8


Frivolous Lifestyle
work
restaurant
night club
golf course
social visit
home
1982
high school
bank
convenience shops
shopping centre
sports arena
provincial park

Annual Car Kmileage 42,929
Current Multipurpose Trips
home-restaurant-gas station-home
home-mechanical repairs-video store-home

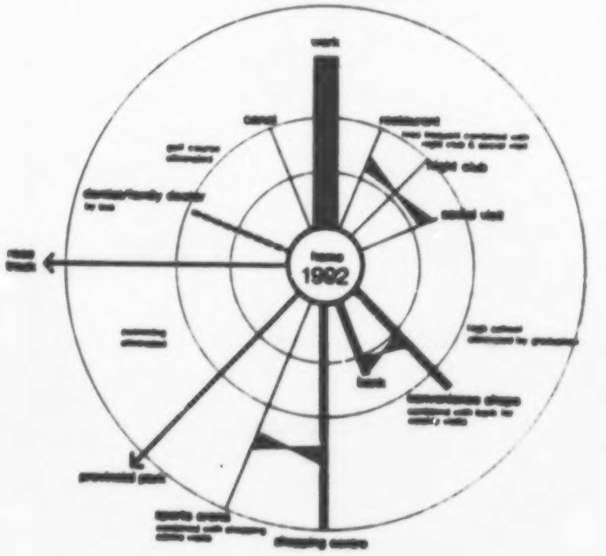
Pairs of Facilities Convenient to Use: 9
1982 Expenditure on: gasoline: $5,400
bus: nil
bicycle: nil

SIMULATED 1992 PATTERN OF HOUSEHOLD TRIPS


Conserver Lifestyle
work
society/club
library
university
park
museum
restaurant
movies
home
1992
convenience shops
dentist/family doctor
market
provincial park
hospital

Annual Car Kmileage 340
Planned Multipurpose Trips
home-university-library-home
home-work-social club-home
home-restaurant-movies-home
home-dentist/family doctor-market-home
home-museum-play park-home

Inventions Purchased
tricycle
Telidon
conversion to hydrogen (car)
(home insulated and weatherized in period 1982-85)


Frivolous Lifestyle
work
restaurant
night club
social visit
dentist/family doctor
home
1992
bank
convenience shops
provincial park
sports arena
shopping centre

Annual Car Kmileage 4,970
Planned Multipurpose Trips
home-sports arena-shopping centre-home
home-bank-grocery store-home
home-social visit-restaurant-night club-home

Inventions Purchased
None

current needs, which respondents reported in statistically very significant numbers - i.e., 99.5% level of confidence, see Appendix 4 - but there is a host of other activities which would have been added at a lower threshold of statistical significance (80%) as for example: -

Sibling's workplace
- bowling alley
- video centre
- cafe. etc.

Wife's workplace
- quality shopping
- restaurant
- movies, etc.

Husband's workplace
- bowling
- dentist
- doctor
- library
- art gallery
- university
- golf course
- law office

etc.

There is also a third category of potential linkages which the respondents could not affect, because the built environment, in the course of haphazard and clinically zoned development in the past, has made very difficult. It was only after two iterations of the Game - when simulating their trips for the period 1989-92 - that respondents 'purchasing' the TELIDON in particular felt free to disregard the conditioning effect of the present environment and affect linkages regardless of spatial constraints. A host of new associations was revealed at low levels of confidence (below 75%). In the light of the foreseeable growth of telecommunciations, these associations could become significant for urban planning only in the light of future trends.

EXPLANATORY NOTE ON THE METHOD OF CUMULATIVE ASSESSMENT OF LINKAGE INTENSITY BETWEEN URBAN FACILITIES

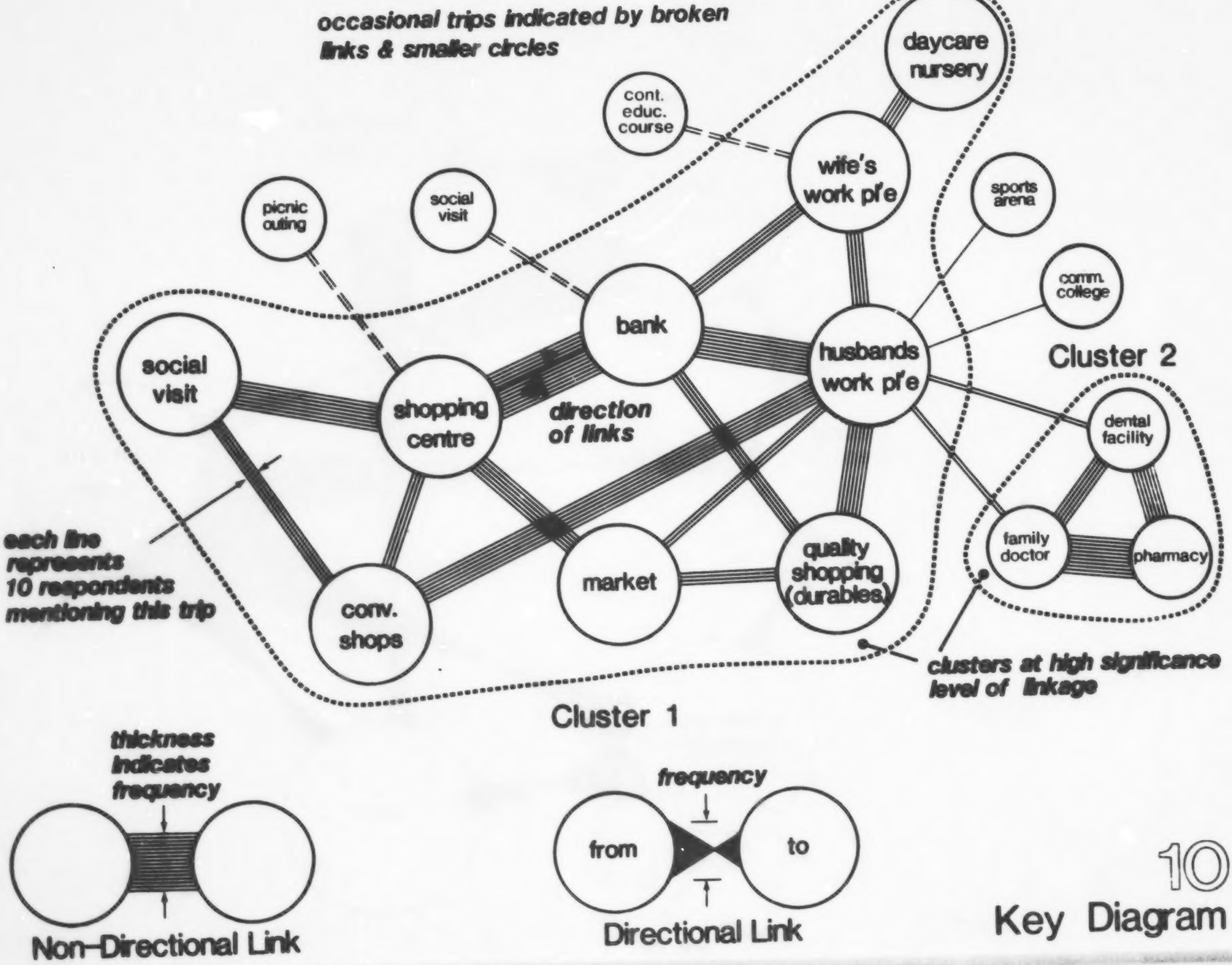
The adjacent key Diagram to several linkage diagrams which follow, indicates the main steps in the method, which may be summarized as follows:-

1. List pairs of facilities indicated by respondents as forming part of a multi-purpose 'round trip' - e.g. home - husband's workplace - bank - shopping centre - home.
2. Indicate the number of respondents mentioning each of these pairs as forming part of their 'round trips' -
   e.g. husband's workplace - bank: 92
   bank - shopping centre: 134
3. Show the direction of journeys as indicated by the respondents. In the case of the bank and the shopping centre for example, 51 respondents went from the centre to the bank, while 83 respondents first went to the bank and then to the shopping centre - see 'direction of links' arrows on the diagram.
4. Select a threshold of high significance level and divide the facilities considered in the analysis into Clusters of closely interrelated activities - e.g. Clusters 1 and 2 in the diagram.
5. Draw directional links between the facilities forming a cluster, as shown in the case of a pair in the diagram.

Occasional trips like picnic outings or visits to the family doctor have been shown in clusters of smaller circles to differentiate them from more frequently used facilities or activities.

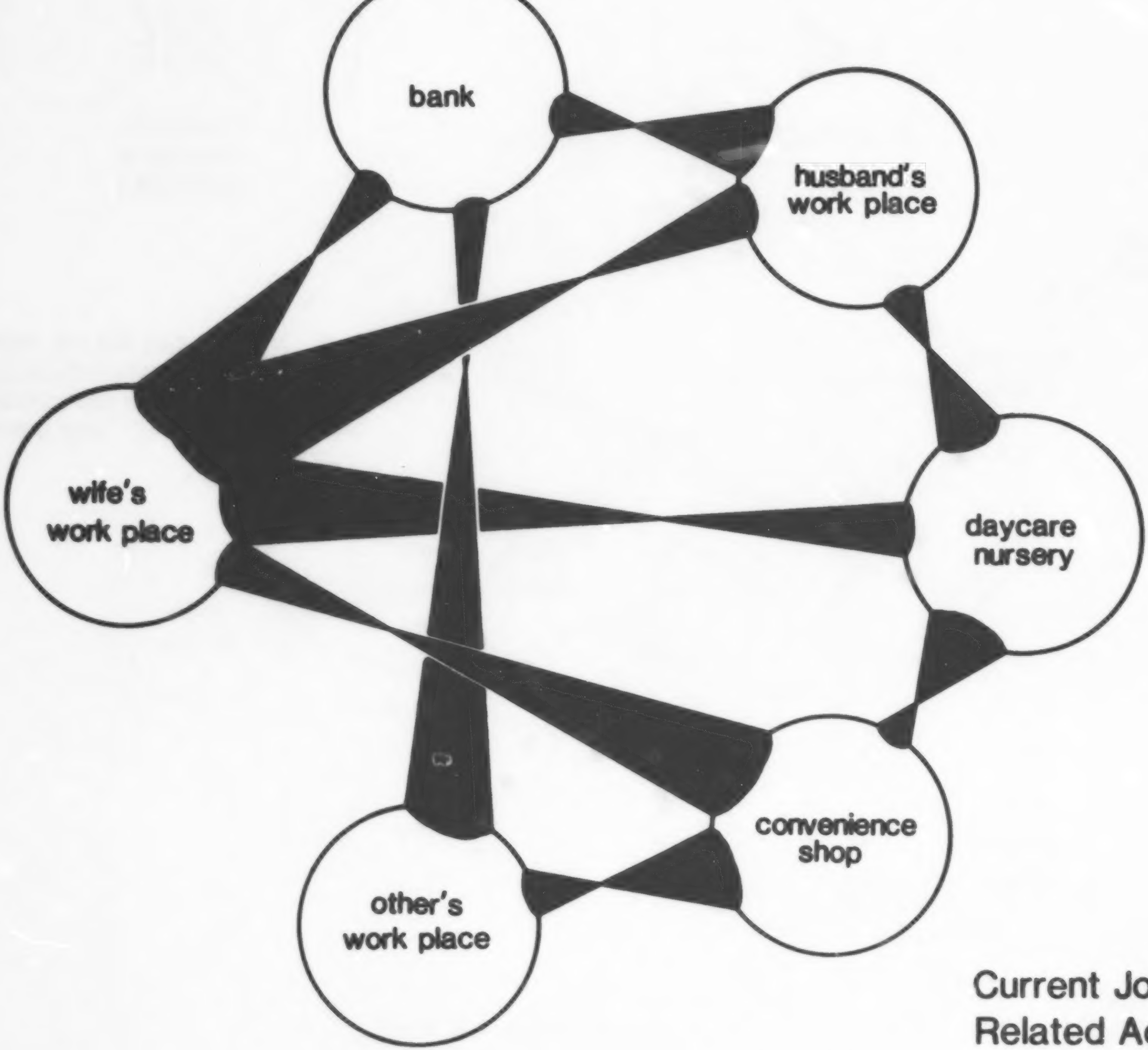
GA:cse-4

020109


occasional trips indicated by broken links & smaller circles
cont. educ. course
daycare nursery
picnic outing
social visit
wife's work pl'e
sports arena
comm. college
bank
husbands work pl'e
Cluster 2
social visit
shopping centre
direction of links
dental facility
family doctor
pharmacy
each line represents 10 respondents mentioning this trip
market
quality shopping (durables)
conv. shops
clusters at high significance level of linkage
Cluster 1
thickness indicates frequency
Non-Directional Link
frequency
from
to
Directional Link

10

Key Diagram


bank
husband's work place
wife's work place
daycare nursery
convenience shop
other's work place

11

Current Journey-to-Work & Related Activities

The most significant trend indicated by the 'purchase of foreseeable telecommunication inventions by the respondents was the increasing localization of employment in the residential environment - i.e., working at home, 'telecommuting', 'telework' or 'homework'. Home occupation is already permitted for a wide range of professions in Ottawa and it appears to be taken for granted by most respondents that the growing 'high-tech' economic base of the Ottawa-Carleton region will foster the massive migration of work to the home. Research, data processing, systems analysis, computer programming, childcare, social work and a growing number of other jobs could be and increasingly will be carried out from a home base. Alvin Toffler devotes an entire chapter (16) to the 'Electronic Cottage' in his THIRD WAVE (1980). J. Nilles (1974) reports pioneering research by a team set up by the US National Science Foundation to estimate the energy expenditure ratio for commuting vs. telecommuting at 29:1 - if a worker commutes by car, - or 11:1 - if he uses a normally loaded bus. And in a recent article in THE FUTURIST, Eder (1983) cites the advantages and disadvantages of telecommuting, as summarized on the table overleaf.

The implications of telecommuting for home and lifestyles will be referred to later in Section 6, but as far as travel patterns are concerned, it appears that as a reaction to the isolation likely to be felt by spending more time at home, respondents indicated a more intensive use of leisure in the evening. Using private or public transport they simulated trips to friends for face-to-face contact, physical recreation, spectacles, entertainment, cultural activities and quality shopping. Among the most popular pastimes were various

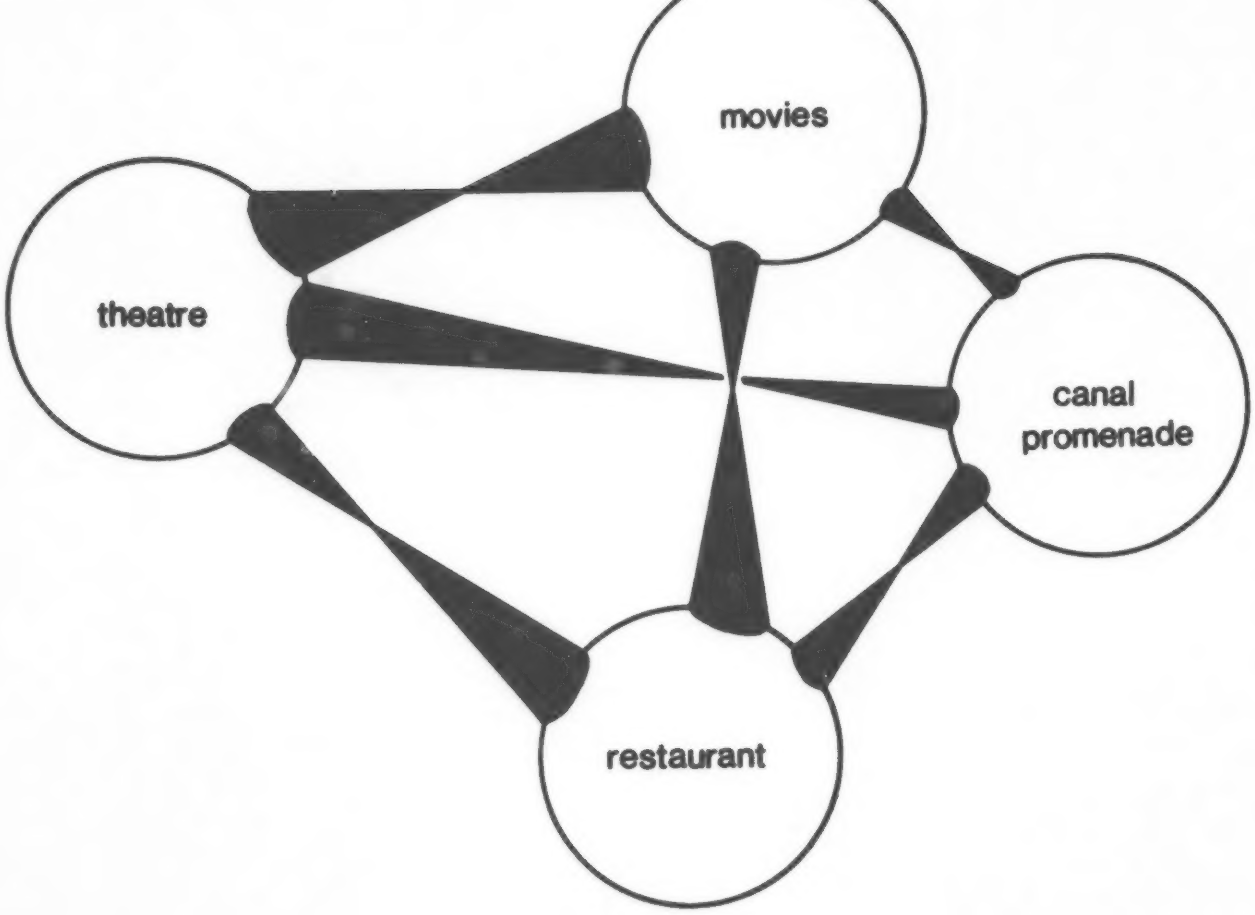
ADVANTAGES AND DISADVANTAGES OF TELECOMMUTING

ADVANTAGES	DISADVANTAGES
- Saves fuel	- Social isolation
- Reduction of car use and congestion	- Could foster workaholism
- Saves time	- Disruption of traditional family roles
- Tax advantages	- Loss of management supervision
- Avoids concentrations of people - fosters the spread of population	- Diminution of corporate identity
- Proven to increase productivity	- Less privacy of information
- Employment of the handicapped made easier	- Heavy record keeping
- Reduction of personnel operation costs and problems	
- Emphasis on the home	

festivals - it appears that Winterlude will grow in popularity. Although most of these are likely to be accessible through TV or radio at home, the respondents indicated that the need for change, exercise and fresh air would make evening outings quite essential. Telecommuting may therefore be expected to lower daytime traffic levels, but increase them in the evening and later at night.

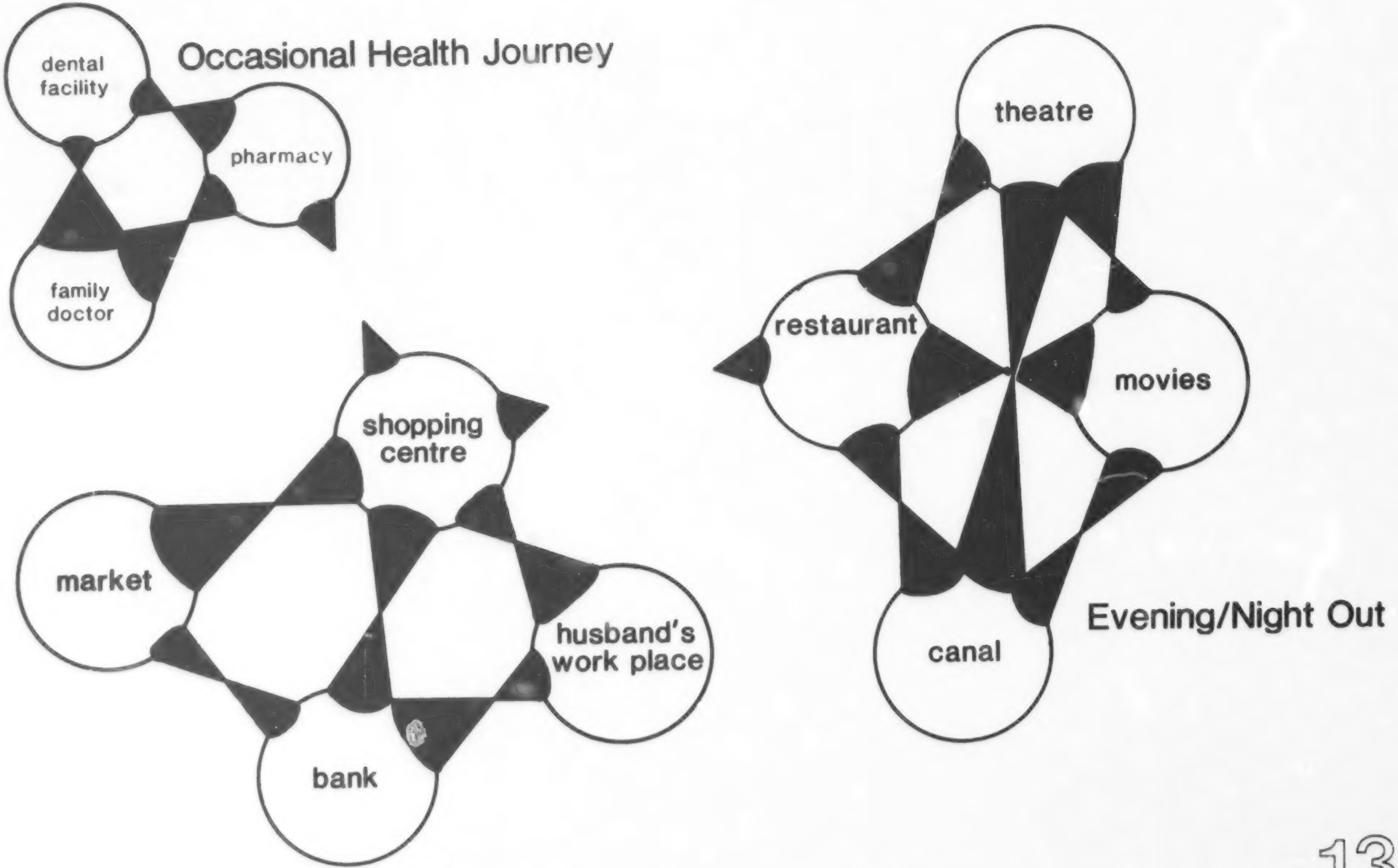
THE NIGHT-OUT TRIP: 1982-1992

Diag. 12 shows current patterns of evening trip at a statistically very high level of confidence (99.5%) in downtown Ottawa, with the Rideau Canal providing a local flavour and urban identity. Once more, it is important to emphasize


movies
theatre
canal
promenade
restaurant

12

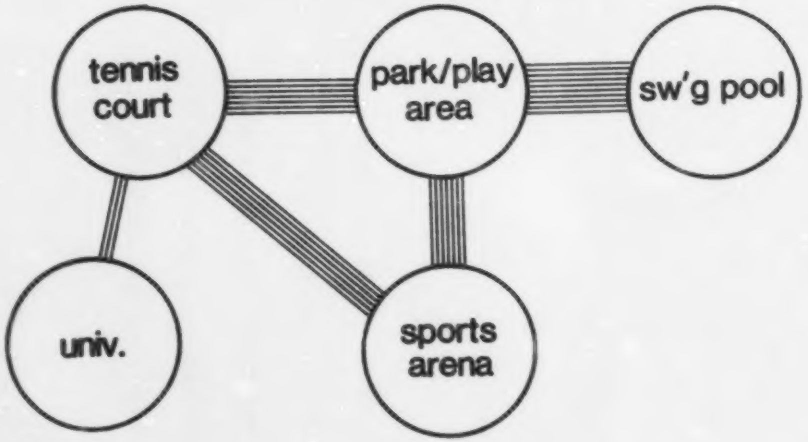
Current Night-out Trips as
Recorded by Respondents

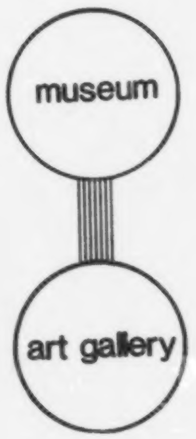


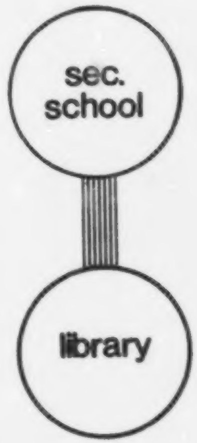
Occasional Health Journey
dental facility
pharmacy
family doctor
shopping centre
market
husband's work place
bank
Daytime Shopping
theatre
restaurant
movies
canal
Evening/Night Out

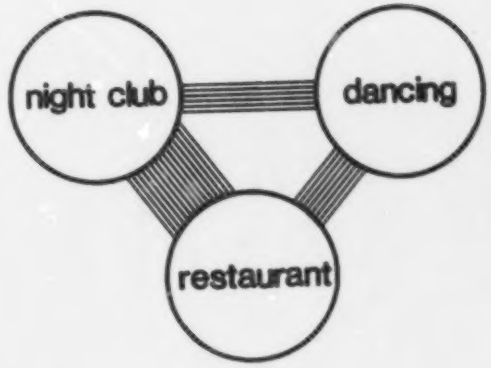
13

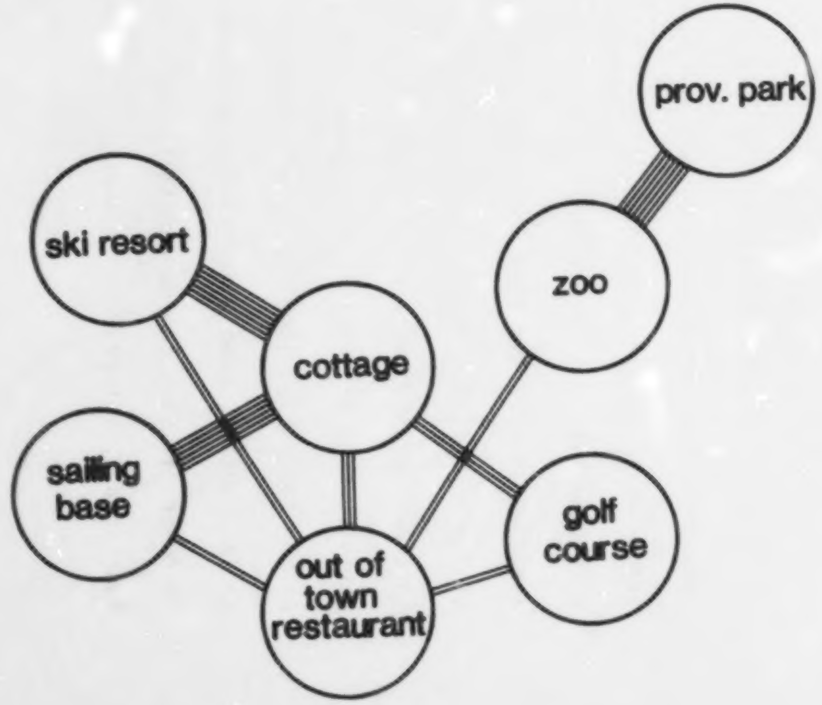
Current Multi-purpose Trips in Downtown Ottawa


tennis court
park/play area
sw'g pool
univ.
sports arena


museum
art gallery


sec. school
library


night club
dancing
restaurant


prov. park
ski resort
zoo
cottage
sailing base
golf course
out of town restaurant

Convenient . Multi–Purpose Trips
Suggested by Respondents

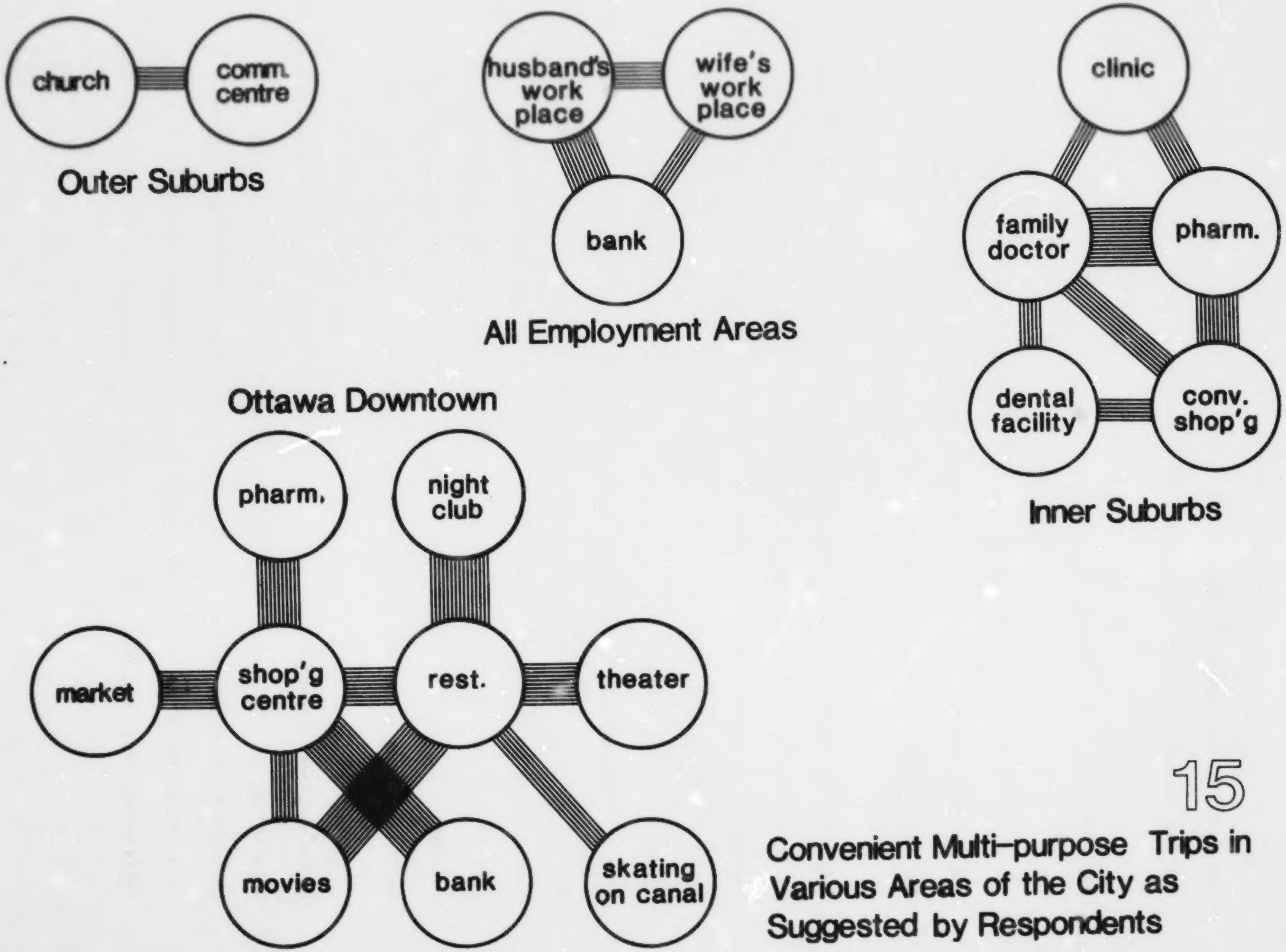
14

Entertainment & Recreation

that at lower levels of significance, a host of other activities, interrelated by an incredibly complex network of linkages would emerge. The cluster of Diag. 12 is shown in its relationship to other clusters of downtown activity discernible at the same level of significance, in Diag. 13. The restaurant, shopping centre - itself a complex of facilities - and the pharmacy have been separated to simplify the diagram, but their frequent association is common experience.

THE SHOPPING TRIP: 1982-1992

Currently, the shopping trip is a weekly, daytime or evening trip to district or regional shopping centres by car, supplemented with weekday trips for convenience items and social contact - Diag. 10. In times of energy shortfall, these trips were simulated by respondents either at a reduced frequency, or as being undertaken by tricycle or finally, being largely eliminated, by the use of TELIDON for bulk purchase items to be delivered home by district store services. The purchase of durable and expensive 'quality' items requiring personal choice was gradually shifted to the evening outing, as part of the work-home family's entertainment, recreation or cultural trip. This emerging association of activities could and perhaps should be fostered through the clustering of facilities, to make it a more convenient and urban experience. Foreseeable 1992 patterns of night-out, shopping, health and other service activity trip are likely to be more closely interrelated - Diags. 13 and 14. As the facilities involved in all these services provide opportunities for social contact, people are likely to visit them during their evening trips. Moreover, if they can be accessible at a few destinations, clustered with functionally interrelated elements, then the outcome will be convenience for


church
comm. centre
Outer Suburbs
husband's work place
wife's work place
bank
All Employment Areas
clinic
family doctor
pharm.
dental facility
conv. shop'g
Inner Suburbs
Ottawa Downtown
pharm.
night club
market
shop'g centre
rest.
theater
movies
bank
skating on canal

15

Convenient Multi–purpose Trips in Various Areas of the City as Suggested by Respondents the consumer and commensalism or joint appeal by virtue of proximate location for the operators of the facilities - see Section 3.

THE EDUCATION TRIP: 1982-1992

The division of the day into 'employment' and 'contact' periods by 1992 may be interpreted also as 'education/retraining' and 'contact' periods for younger and for unemployed adults in the population.

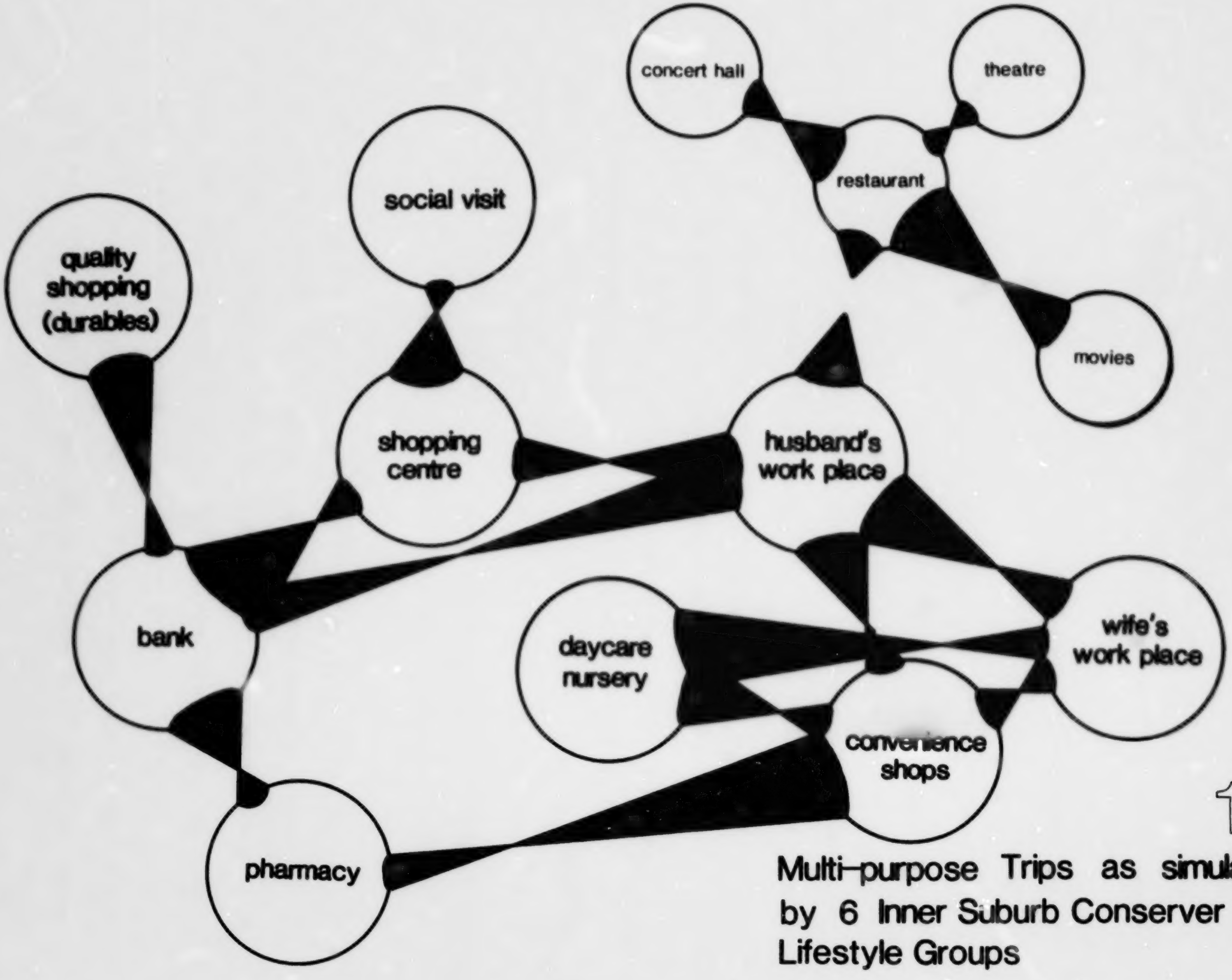
A great many 'doom scenarios' have appeared in recent years about the potential increase in unemployment due to advancing automation and some of them have been summarized by Morf (1983). He concludes that the demise of work has tended to be greatly exaggerated and that "people will always feel a need to repair their houses and to pull weeds from their flower beds. They will always farm out some of this work to the neighbour's kids and to small entrepreneurs offering specialized services." None of the surveys undertaken as part of this project have touched on this subject, but it may be safely assumed that a substantial part of the education trip in the future will be undertaken for purposes of retaining, in order to adjust to the employment changes likely to be required by the evolving technology and economy of the 1980's.

At primary and secondary education levels, the journey-to-school, whether based on walking, cycling or the use of public transport is likely to continue throughout the study period. At higher education levels and in the growing 'continuing education' sector which will increasingly cater for people's retraining needs, the home computer and videotext terminal is likely to eliminate a great deal of the current trips. The chance to improve one's skills and education at home, with occasional lectures at some institution was welcome to the majority of respondents.

WEEKEND AND DAY-TRIPS: 1982-1992

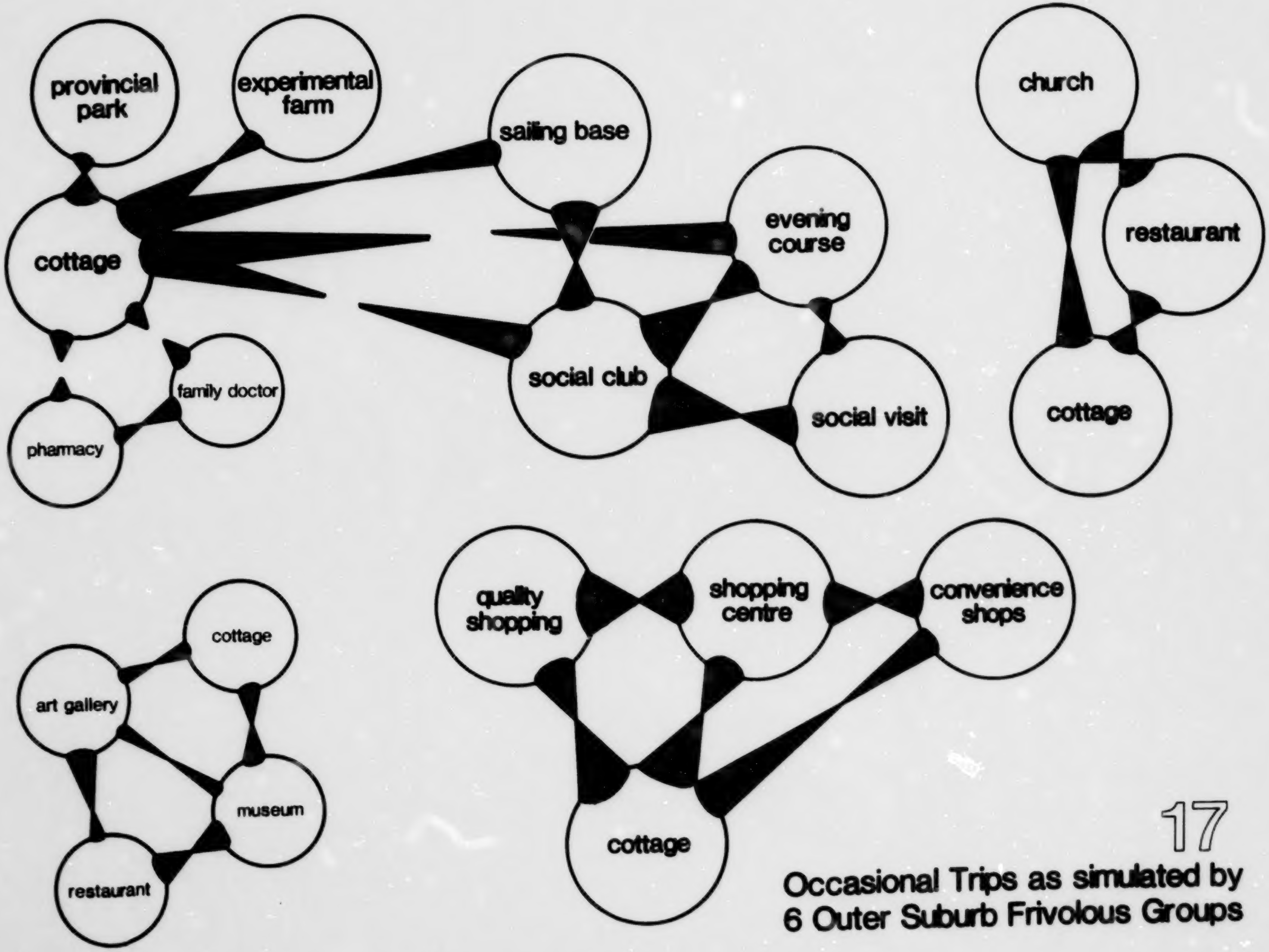
Weekend traffic patterns vary enormously for various income groups, but as the focus of this project was centered on lifestyles and their implications for land-use planning, it is the contrast between 'conserver' and 'frivolous' lifestyles that has been illustrated in Diags. 16 and 17. The former appeared to make their weekends more varied by dividing the summer season or the month into 'cottage' and 'in-town' alternatives. The 'cottage weekend' in that case, involved a single return trip to a country location, to enjoy all the sports and recreational activities available in that environment - see lower left-hand cluster in Diag. 14. As regards the 'in-town weekend', there appeared to be at least two or three major activities as shown on Diag. 16. Shopping, followed by a social visit, or the occasional outing to the restaurant and subsequently,the theatre, or the concert hall, or the movies - the trip being on all these occasions, truly multi-purpose.

By contrast, the weekends of 'frivolous' lifestyle groups appear to be mostly or exclusively centered on the cottage and involve long or short trips - often back to the city - for various purposes, as shown on Diag. 17. These trips are often single purpose and long, but the cumulative representation of linkages has resulted in the formation of some small clusters on the diagram. These diametrically opposed patterns of travel between 'conserver' and 'frivolous' groups are likely to be modified in the case of energy shortfall and price


concert hall
theatre
restaurant
movies
social visit
quality shopping (durables)
shopping centre
husband's work place
bank
daycare nursery
wife's work place
convenience shops
pharmacy

16

Multi–purpose Trips as simulated by 6 Inner Suburb Conserver Lifestyle Groups


provincial park
experimental farm
cottage
sailing base
family doctor
pharmacy
social club
evening course
social visit
church
restaurant
cottage
cottage
art gallery
museum
restaurant
quality shopping
shopping centre
convenience shops
cottage

17

Occasional Trips as simulated by
6 Outer Suburb Frivolous Groups

hikes which are perceived to be larger than income increases of the household. The 'conservers' are likely to increase the number of 'in-town weekends' during the summer season, while the 'frivolous' are likely to cut out the cottage visit for several weeks at a time. As already indicated however, no household considered selling the cottage during the study decade, "just for the sake of energy." The weekend picnic outing or day-trip is also likely to become a substitute to the cottage visit in times of energy shortfall, particularly if several of the activities indicated on the lower left-hand cluster in Diag. 14 are available at a location near town.

CONCLUSION

While travel patterns are likely to evolve dramatically in the case of most urban activities during the study decade, one of the most effective ways to conserve energy - minimizing car travel - could be considerably encouraged through the judicious formation of clusters of facilities, to extend the scope for multi-purpose trips in town and country.

GA:smr-5
D2D112

SECTION 6

FORESEEABLE CHANGE IN LIFESTYLES: 1982-1992

On the assumption that change in lifestyles calls for corresponding changes in the distribution of urban facilities and other land uses to serve people, the work summarized in this Section consists of:

i. A classification of the 306 respondents into the 36 lifestyles established for 1982 in Section 2;

ii. An investigation into the factors underlying the change of lifestyles over the study decade 1982-1992;

iii. A second classification of the respondents into foreseeable 1992 lifestyles;

iv. An identification of main trends in lifestyle changes between 1982 and 1992.

The impact of this change on land use and on urban planning in general will be the subject of investigation in Section 7.

CLASSIFICATION OF CURRENT (1982) LIFESTYLES

The criteria established for the classification of current lifestyles were established through a Principal Components Analysis of household trips, energy use and socio-economic variables as shown on Table 2 in Section 2 and they will be listed here for convenience:-

1. Distance of residential location of the household from cottage, restaurants, husband's workplace, shopping centres, movies, the theatre, sports arena, parks and play areas;
2. Number of persons in the household; Education, occupation and age of the head of the household; Education of the second important member of the household;
3. Expenditure on gasoline, on car(s) in the household, on heating oil, on natural gas and electricity, use of solar heating and public transport; Total income of the household;
4. Total annual mileage run on the car;
5. Number of facilities visited in 'round trip' fashion.

Table 16: 1982 OTTAWA LIFESTYLES IN RELATION TO ENERGY USE AND IN COMPARATIVE PROPORTION OF POPULATION

NOTE: 1-p = 1 person; IC = Inner City; IS = Inner Suburbs; CS = City Suburbs; C = Conserver; F = Frivolous

Lifestyle Codes	No of households in survey	No. of persons in survey	% of survey pop.	City popul'n
1-p (IC) C	1	1	(0.2)	605
2-p (IC) C	8	16	(2.1)	6,352
3-p (IC) C	7	21	(2.8)	8,469
4-p (IC) C	6	24	(3.2)	9,679
5-p (IC) C	5	25	(3.3)	9,982
6-p (IC) C	1	6	(0.8)	2,421
TOTAL	28	93	(12.4)	37,508
1-p (IS) C	36	36	(4.8)	14,519
2-p (IS) C	12	24	(3.2)	9,679
3-p (IS) C	9	27	(3.6)	10,889
4-p (IS) C	8	32	(4.3)	13,007
5-p (IS) C	8	40	(5.3)	16,032
6-p (IS) C	2	12	(1.6)	4,844
TOTAL	75	171	(22.8)	68,967
1-p (CS) C	18	18	(2.5)	7,562
2-p (CS) C	11	22	(2.9)	8,772
3-p (CS) C	8	24	(3.2)	9,679
4-p (CS) C	10	40	(5.3)	16,032
5-p (CS) C	6	30	(4.0)	12,099
6-p (CS) C	2	12	(1.7)	5,143
TOTAL	55	146	(19.6)	59,287
TOTAL 'CONSERVERS'	172	410	(54.8)	165,762
1-p (IC) F	5	5	(0.7)	2,117
2-p (IC) F	9	18	(2.5)	7,562
3-p (IC) F	6	18	(2.5)	7,562
4-p (IC) F	6	24	(3.2)	9,679
5-p (IC) F	-	-	-	-
6-p (IC) F	1	6	(0.7)	2,118
TOTAL	27	71	(9.6)	29,038
1-p (IS) F	3	3	(0.4)	1,210
2-p (IS) F	8	16	(2.1)	6,352
3-p (IS) F	8	24	(3.2)	9,679
4-p (IS) F	9	36	(4.7)	14,216
5-p (IS) F	3	25	(2.0)	6,050
6-p (IS) F	2	12	(1.7)	5,143
TOTAL	33	106	(14.1)	42,650
1-p (CS) F	36	36	(4.8)	14,519
2-p (CS) F	14	28	(3.7)	11,188
3-p (CS) F	7	21	(2.8)	8,469
4-p (CS) F	10	40	(5.3)	16,032
5-p (CS) F	5	25	(3.3)	9,982
6-p (CS) F	2	12	(1.6)	4,844
TOTAL	74	162	(21.5)	65,034
TOTAL 'FRIVOLOUS'	134	339	(45.2)	136,722
GRAND TOTAL	306	749	(100.0)	302,486

(Slight inaccuracies are due to rounding-off some figures).

On the basis of the 24 items comprised in these 5 groups of criteria, it was possible to classify the 306 respondents of the Ottawa Energy Budgets Game and arrive at the comparative proportions of the City's population in various lifestyles, as shown on Table 16. This table indicates that from the point of view of energy utilization, Ottawa's population may be divided into 'conserver' and 'frivolous' lifestyle groups, each occupying a position somewhere between these two extremes, in accordance to detail measurement along the classification criteria. Although the 'City population' column indicates an accuracy to the nearest person, the 'percentage of survey population' column gives a more reliable indication of the relative proportion of each lifestyle group, to the total population. It may therefore be concluded that 54.8% of the current population of Ottawa may be considered as 'conservers', while 45.2% are 'frivolous' in the use of energy, to a greater or lesser extent. Being extreme, these two terms may be far from perfect, but sometimes even imperfect terms help to express some concepts. The overwhelming majority of people fall between these extremes, as in every statistically normal distribution.

A summary of the average characteristics of these lifestyle groups is given on Table 17 and a more detailed analysis is presented in Tables 14-25 in Appendix 6 in the APPENDICES volume. The main conclusions may be summarized as follows:-

a. 'Frivolous' lifestyle groups are slightly younger than 'conserver' groups, on average;

b. 'Conservers' appear to earn more on average and their behaviour appears to be motivated by conviction, in general, rather than financial circumstance;

c. 'Conservers' spend less on the car, on oil and gasoline in particular, but they spend more on bus transport, electricity or natural gas and on solar heating - whether active or passive;

d. The annual kmileage run in 1982, or simulated by 'conservers' for trips over the study period was consistently lower than that of 'frivolous' groups.

TABLE 17: SUMMARY* OF AVERAGE AGE AND EXPENDITURE CHARACTERISTICS OF OTTAWA LIFESTYLES, 1983-1992.

AVG. CHARACTERISTIC OR EXPENDITURE RELATED TO ENERGY		CONSERVER LIFESTYLES (18 GROUPS)	FRIVOLOUS LIFESTYLES (18 GROUPS)
Age	(1983)	34.25 years	32.92 years
Income	(1983)	$13,062	$12,479
Car Expenditure			
	(1983)	$978.59	$1,268.08
	(1988)	$1,657.00	$4,317.00
Annual Kmileage Run			
	(1982)	6,959 kms	14,695 kms
	(1983-85)	4,929 kms	10,306 kms
	(1986-88)	2,124 kms	4,499 kms
Bus Transport			
	(1982)	$199.34	$149.10
	(1983-85)	342.00	289.00
	(1986-88)	513.00	472.00
	(1989-92)	834.00	703.00
Hydro Electricity			
	(1982)	$575.60	$301.77
Natural Gas			
	(1982)	$587.97	$280.40
Oil	(1982)	$482.30	$638.94
Gasoline	(1982)	$529.94	$790.68
Solar Heating			
	(1982)	$154.00	$102.00
Relative Percentage of City Population in:-			
	(1982)	55%	45%
	(1985)	66%	34%
	(1988)	70%	30%
	(1992)	72%	28%

* Summary of Tables 14 to 25 in APPENDICES volume.

GA:cmm-2
D2D107

The value of numerical indications of the characteristics and relative proportion of various lifestyle groups will be seen in Section 7, when the suggestion of clusters of activities to extend the current scope for multi-purpose trips - as given by each lifestyle group - is to be considered. Evidently, the more numerous a lifestyle group, the more valid - or 'statistically significant' - may a suggested cluster be considered for planning purposes.

FACTORS UNDERLYING THE CHANGE OF LIFESTYLES: 1982-1992

The analysis of data provided by the 306 households responding to the Energy Budgets Game Survey - as summarized in Section 4 - indicated that among the great variety of subjects considered in that survey, in the relaxed content of a game, the following stand out as the most likely to affect change in the prospects and behaviour of the lifestyle groups identified in this study:-

1. Receptiveness to innovation: - Respondents who were quick to 'purchase' foreseeable inventions related to energy, appeared to be the most successful in meeting the objective of the simulation game - preserve and if possible extend the range of activities of a household, in order to enrich their lifestyle, despite the foreseeable uncertainty on energy;

2. Versatility in the choice of transport mode: - Although diversification of fuel away from gasoline was the obvious objective in the choice of transport mode, the factor which increasingly came to be discovered by the more prudent households was the selective use of transport modes to fit the occasion, distance, weather, time of day and personal or family circumstances for a particular trip. The indiscriminate use of a car - whether run by gasoline or some other fuel - for prestige or other sentimental reasons was gradually eliminated;

3&4 Planned trips and the use of leisure time: - As leisure time and the evening outing in particular came to be considered the climax of the day, the trip associated with that outing was more carefully planned, to involve several destinations and objectives. Multi-purpose trips became the means by which respondents expressed the greater value they tended to attach to leisure, as the simulation progressed;

5. Perseverence in the activities constituting a lifestyle: - This was evidenced very often in the course of the Energy Budgets Game, as a respondent anxious to keep to the suggested limit of annual kmileage - a limit which reflected energy prices current at a given period in comparison to 1982 prices - would try several alternatives in transport mode and multi-purpose trip, in order to avoid sacrificing an activity from the household's lifestyle;

6. Ability to benefit from incentives to home renovation: - In the effort to improve the home environment towards greater energy efficiency and to adjust it to a family's social, work, recreational and other novel residential needs, it was clear that some households were more apt than others in getting the maximum benefit from grants and tax incentives for these purposes.

Beyond these six factors which could be seen 'at work' during this survey, because the Energy Budgets Game included questions or moves relating to them - see Appendix 3 in APPENDICES volume - there could be cited some other, less quantitative and more speculative factors as follows:-

7. Adjustment to technological change: - The threat posed on employment by the spread of automation, appeared to make some respondents more willing to retrain in novel skills than others.

8. Adjustment to a home-centred life: - The homework lifestyle was welcome to the majority of respondents, but at least 23% appeared to entertain some doubt and would rather leave the decision to their employer. Toffler (1980) has referred to "hot" relationships arising from work at home - "Forced proximity, it goes without saying, does not guarantee happiness" (p. 218). The transformation of relationships likely to be required in home-centred life will require an aptitude to adjustment which perhaps few people possess. Husband and wife for example will require "Love plus conscientiousness, responsibility, self-discipline or other work-related virtues" (p. 219).

9. Adjustment to household subdivision: - The decreasing size of households was a continual expectation in the study period projections made at the symposium - see separate SYMPOSIUM volume. It would therefore be reasonable to allow for adjustment to single-parenthood or single-person lifestyles as part of a challenge of family life in the foreseeable future.

All these factors could evidently be expected to affect the typology of lifestyles by 1992 and the identification of these lifestyles was the next step in the process.

CLASSIFICATION OF 1992 LIFESTYLES

In order to be vigorous and objective, a classification should be based on quantitative criteria. This condition could be satisfied in only 6 of the above-mentioned 9 new criteria for the differentiation of 1992 lifestyles, as follows:-

CRITERIA	QUANTITATIVE BASIS
1. Receptiveness to innovation	Number of inventions or conversions 'purchased' during the simulation game.
2. Versatility in the choice of transport mode	Number of modes used other than the gasoline car.
3&4 Planned trips and use of leisure	Number of multi-purpose trips; Number of recreational cultural, entertainment and other facilities.
5. Perseverance in the activities constituting a lifestyle	Number of facilities remaining constant or increasing during the simulation game.
6. Ability to benefit from incentives for home renovation and retrofitting	Number of grants obtained during the simulation game.

When these 6 new criteria were joined to the 24 items established as criteria for the differentiation of lifestyles in 1982, the total of 30 quantitative criteria served as a basis for the typology of 1992 lifestyles for Ottawa, shown on Table 18. The noteworthy features of this classification are as follows:-

a. It consists of three types of lifestyle groups - 'conservers', 'resilient conservers' and 'frivolous' - rather than two extremes as in the case of the 1982 classification;

b. The proportion of 'conservers' has grown considerably. This conclusion must be accompanied with the assumption of energy prices rising faster than incomes, as underwritten in the scenarios on which the Ottawa Energy Budgets Game was based. Should the relationship of incomes and energy prove to be different during the study decade, the typology and relative proportion of lifestyle groups might be different;

Table 18: 1992 OTTAWA LIFESTYLES IN RELATION TO ENERGY USE AND IN COMPARATIVE PROPORTION OF POPULATION

NOTE: 1-p = 1 person; IC = Inner City; IS = Inner Suburbs; CS = City Suburbs; C = Conserver; RC = Resilient Conserver; F = Frivolous

Lifestyle Codes	No of households in survey	No. of persons in survey	% of survey pop.	City popul'n
1-p (IC) C	4	4	(0.5)	1,575
2-p (IC) C	9	18	(2.4)	7,560
3-p (IC) C	6	18	(2.4)	7,560
4-p (IC) C	7	28	(3.7)	11,655
5-p (IC) C	6	30	(4.0)	12,600
6-p (IC) C	1	6	(0.8)	2,520
TOTAL	33	104	(13.9)	43,785
1-p (IS) C	30	30	(4.0)	12,600
2-p (IS) C	14	28	(3.7)	11,655
3-p (IS) C	12	36	(4.8)	15,120
4-p (IS) C	10	40	(5.3)	16,695
5-p (IS) C	9	45	(6.0)	18,900
6-p (IS) C	3	18	(2.4)	7,560
TOTAL	78	197	(26.3)	82,845
1-p (CS) C	16	16	(2.1)	6,615
2-p (CS) C	9	18	(2.4)	7,560
3-p (CS) C	12	36	(4.8)	15,120
4-p (CS) C	11	44	(5.9)	18,585
5-p (CS) C	6	30	(4.0)	12,600
6-p (CS) C	2	12	(1.6)	5,040
TOTAL	56	156	(20.8)	65,520
TOTAL 'CONSERVERS'	167	457	(61.0)	192,150
2-p (IC) RC	2	4	(0.5)	1,575
3-p (IC) RC	3	9	(1.2)	3,780
4-p (IC) RC	3	12	(1.6)	5,040
5-p (IC) RC	3	15	(2.0)	6,300
TOTAL	11	40	(5.3)	16,695
1-p (IS) RC	2	9	(1.2)	3,780
2-p (IS) RC	3	6	(0.8)	2,530
3-p (IS) RC	3	9	(1.2)	3,780
4-p (IS) RC	2	8	(1.0)	3,455
TOTAL	17	32	(4.3)	13,545
1-p (CS) RC	4	4	(0.6)	1,890
2-p (CS) RC	3	6	(0.8)	2,520
TOTAL	7	10	(1.4)	4,410
TOTAL 'RESILIENT CONSERVERS'	35	82	(11.0)	34,650
1-p (IC) F	2	2	(0.3)	630
2-p (IC) F	6	12	(1.6)	5,040
3-p (IC) F	4	12	(1.6)	5,040
4-p (IC) F	2	8	(1.0)	3,150
5-p (IC) F	---	---	---	---
6-p (IC) F	1	6	(0.8)	2,520
TOTAL	15	40	(5.2)	16,380
1-p	---	---	---	---
2-p	3	6	(0.6)	1,890
3-p	4	12	(1.6)	5,000
4-p	4	16	(2.1)	6,605
5-p	2	10	(1.3)	4,175
6-p	1	6	(0.8)	2,500
TOTAL	14	50	(6.4)	20,160
1-p	34	34	(4.5)	14,000
2-p	13	26	(3.4)	10,635
3-p	---	---	---	---
4-p	7	28	(3.7)	11,500
5-p	5	25	(3.3)	10,505
6-p	2	12	(1.6)	5,404
TOTAL	61	125	(16.4)	51,880
TOTAL 'FRIVOLOUS'	90	210	(28.0)	88,200
GRAND TOTAL	306	749	(100.0)	315,000

(Slight inaccuracies are due to rounding-off some figures).

c. 'Resilient conservers' become fewer in the suburbs and in larger households. It appears that geography and large household size could strongly militate against energy conservation in 'resilient' ways, as defined earlier in this Section.

The growth of telecommunications may eliminate the factor of geography in energy conservation, while the trend towards smaller households may cause an increase in overall energy consumption in a city.

MAIN TRENDS IN LIFESTYLE CHANGE: 1982-1992

As a direct outcome of the Symposium discussions and the opportunity to apply most of the significant projections made by the specialists participating in that event through the Ottawa Energy Budgets Game Survey, the following changes in lifestyle appear likely in the Ottawa area by 1992:-

1. Reduction in size of households;
2. Growth in the total number of households;
3. Growth of telecommunications for social, as well as economic purposes;
4. Growth of willingness and opportunities to work at home;
5. Growth of mechanization and automation at home;
6. Greater preoccupation with the structural and comfort aspects of the family home;
7. Variable acceptance of new inventions by various lifestyle groups;
8. Variable reaction to isolation at home, by various lifestyle groups;
9. Variable acceptance of retraining and continuing education opportunities by individuals;
10. Sub-division of week and day into 'work/education' and 'contact' periods.

Evidence of these trends, established through the survey, may be summarized as follows:-

1. Reduction in the size of households: More than 60% of the households surveyed, had teenage siblings which would leave home, to live by themselves or form their own household within the study period 1982-1992.

2. Growth in the total number of households: The above mentioned figure of 60% meant that the original sample of 306 families in 1983 could be expected to grow to some 507 households by 1992.

3. Growth of telecommunications for social as well as economic purposes was evident in the fact that the most frequently "purchased" inventions in all three periods of the Energy Budgets Game were related to telecommunication: - i.e., the TELIDON (21.7%); Pay TV (5.8%); 3-D TV (1.1%); Two-way terminals (4.3%) and Home medical care (10.6%) - see Table 15 - giving a total of no less than 43.5% of all respondents, using telecommunications during the decade. The purpose for which they were used by the more educated respondents were as follows:-

- Teleshopping
- Telebanking
- Teleconferencing
- Telecommunicating
- Televoting
- Work
- Entertainment
- Research
- Education
- Medical care

The ultimate purpose in this great variety of uses was to reduce car kmileage, but the more sophisticated respondents were also highly aware of the savings in time and money and squeezed more activities in their lifestyle. (As it may be noted from the Instructions accompanying the Energy Budget Game in Appendix 3 - see APPENDICES volume - the reward for using less mileage than the specified limit for a particular period was the privilege to visit or "invent" a new facility by naming an outlet for one's talents).

4. Growth of willingness to work at home was indicated by 44% of respondents, but a substantial 23% indicated that the opportunity to do so, depended on their employer. An important part of both these figures was related to computer-oriented jobs - 57% - while the service element amounted to 35%. The remaining 18% is more related to construction (12%) than manufacturing. As the entire question about the willingness and opportunity to work at home was based on speculation on the part of the respondent, the only reliable outcome is that information, service and some construction are likely to be the economic activities which will lend themselves to working at home in the Ottawa area, during the study period.

5. Growth of mechanization and automation at home was evidenced by the "purchase" of mechanical robots by 2.2% of the respondents as well as 43.5% of them "purchasing" telecommunications. The growing number of home appliances incorporating microcomputers for programming their operation has already revolutionized housework. The impact of more leisure at home may mean more socializing on one hand, or more TV viewing on the other.

6. Greater preoccupation with the family home may be a logical reaction to the migration of work and the liberation from housework, allowing many respondents to spend most of the 24-hour cycle at home. As evidenced in the survey however, no fewer than 77% of all respondents availed themselves of the Grants and Chance cards in the Energy Budgets

Game - see APPENDICES volume, (Appendix 3) - to select some renovation, retrofitting, rehabilitation and improvement feature for their home. Such a high percentage would amply justify the expectation - expressed by the Housing specialist at the Symposium, see Table 11 - that more sophisticated renovation and retrofitting techniques could be developed by 1986-88 to allow the massive upgrading of apartment dwellings built in the 1960's. The savings affected by improvements were used by some respondents to "buy" extra gasoline to burn in the car, or to "purchase" an invention to save energy by others. "It takes all sorts to make a world" and whatever the motivation of the respondents in availing themselves of grants, the educational value of this feature of the Energy Budgets Game could not be denied.

7. The variable acceptance of new inventions by respondents belonging to various lifestyle groups is an evident trend. When 'conserver' and 'frivolous' lifestyles are being compared however, and the acceptance figures favour the 'conservers' - by no less than 18% - it can only be concluded that the 'frivolous' sometimes fail to help even themselves, let alone society, by missing opportunities to conserve energy. This failure to see and avail oneself of energy conservation opportunities may be due to:

    - the "purchase" price of an invention being apparently "high" - i.e., failure to think in payback-through-savings terms;
    - failure to perceive energy conservation opportunities in an invention - "How could Home Medical Care by TELIDON help me to go to work by car?" was one question by some respondents;

- "Showing-off" generosity, by not condescending to "miserly habits";
- feeling "ashamed to behave like that".

Evidently there is a question of upbringing involved in 'frivolous' behaviour, just as in the case of 'conserver' behaviour.

8. The variable reaction to isolation at home by various lifestyle groups is also an evident expectation. In accordance with their education and means, people will greatly differ in their choice of what to do after spending some 15 to 20 hours at home. The great majority of respondents spent the evening hours for physical recreation, for entertainment, for comparative shopping, for socializing, or other face-to-face contact opportunities. Although most of these could be enjoyed on TV or video, people preferred to get away from home. Social visiting was in some instances replaced by telecommunication - particularly videophone or long distance call, but close relationships always seemed to require face-to-face contact. Many persons wanted to go to some spectacle, to give them a sense of occasion and of a "getting away from the humdrum". A minority indicated no concern in continuing to stay at home and watching "some other channel on TV". The quest for fresh air and physical exercise motivated most outings.

9. The variable acceptance of retraining and continuing education opportunities by individuals is also an obvious deduction from current trends. When discussing the simulation procedure with an unemployed respondent, interviewers had been instructed to ask whether retraining had been undertaken, or was likely to be undertaken. Thereafter the 10-

year simulation of daily trips could start on the basis of a new career - in the case of a positive response - or continued unemployment - in the case of a negative response. In general terms, all highly educated respondents responded positively.

10. The subdivision of the week and the day into work/education period vs contact period appears to be a sequel to the homeward migration of work. A day of the working week tended to be allocated for meetings and due allowance was made for travel by private transport - propane, hydrogen or electric car, occasionally, the choice of 'conservers' falling on the bicycle. The working day would also be subdivided into work-hours and social-contact-hours to help relieve the isolation of working at home. Had this outcome been predicted at the Symposium of 12 specialists - see summary of projections on Table 11 - then the invention of a 'Social - disposition - pill' or 'Social - relationship - drops' predicted for 1990 - see list of CONCERNS ABOUT THE FUTURE in SYMPOSIUM volume - would have been included in the set of inventions offered to respondents during the Energy Budgets Game. It is difficult to say whether the relationship of such a 'pill' or 'drops' to trends over the study period would have been guessed by the respondents.

The implication of these lifestyle changes for land-use planning form the subject of the remainder of this report.

GA:cl-4
D2D114

SECTION 7

TOWARDS ENERGY-EFFICIENT PATTERNS OF LAND USE

The objective in this final section of the study is to bring the entire investigation into foreseeable patterns of energy use, travel and lifestyle to conclusions which are relevant to urban planning. Four major subjects will be dealt with, as follows:-

a. The interpretation of foreseeable patterns in energy use, household trip and lifestyle change into energy-efficient land use patterns;

b. A comparison of the above patterns with existing patterns of land use in selected parts of the City;

c. The process of implementing energy-efficient patterns of land use; and

d. The possible impact of foreseeable needs in the interrelationship of urban activities, on urban planning methodology.

The underlying assumption throughout this Section will be that the scarcity or uncertainty in energy supplies may not be fully resolved, unless the land-use pattern of a city is modified to help the citizen minimize car travel without sacrificing convenience.

A. THE INTERPRETATION OF LIFESTYLE CHANGES INTO LAND-USE PATTERNS

The key to such an interpretation, from the point of view of this project, is an understanding of the social and economic needs of each lifestyle pursued in a city. These needs are expressed as personal or household visits, correspondence and telecommunication, from home to various facilities. The progress of technology in this respect, may be gauged by the convenience, gain in time and savings in energy realized through the elimination of the need for the physical transfer of persons in the pursuit of their needs. Such an elimination would evidently foster energy conservation. All indications in current literature and conferences related to urban planning - including the projections of various specialists in the Ottawa region, as expressed at the SYMPOSIUM (see separate volume by that title) and summarized in Table 11 - are that the 1980's will be a decisive period for the advance of telecommunications towards the drastic reduction of physical trips in the city. This supposition makes it all the more important to interpret the need for linkage between any two facilities - i.e. land uses -in a manner that will provide guidance as to their physical proximity and distribution in relation to other facilities, in order to minimize destinations for the consumer and help him save energy.

The Ottawa Energy Budgets Game provided respondents with a wide range of transport modes and forthcoming inventions - see APPENDICES volume - in order to allow them choice in access and the option of keeping abreast with technological developments in telecommunications, to eliminate personal visits at their own discretion. Naturally, a respondent's social values, psychological acceptance and 'purchase' value of the invention offered at each period of the Game were very much involved in this exercise of discretion. At no period however, did any respondent choose to completely eliminate personal visits or outdoor activities for the sake of telecommunications or energy conservation. Participation in a variety of activities was continued by all respondents by resorting to multi-purpose 'round trips' or 'one-leg' trips to a complex of facilities, in order to minimize destinations in the city and save energy.

FREQUENCY OF VISITS AND LINKAGE

In addition to the activities they considered essential for their lifestyle at each period, respondents indicated also the frequency of their visits. Moreover, the cumulative sum of visits by all respondents visiting facilities one after the other, indicated the strength of linkage between various pairs of facilities. Indications of linkage obtained by survey however, had to be tested as to their statistical significance, before acceptance as a valid consideration for some form of relationship between facilities. Reference to Student's 't' test tables of the significance of correlation values (Fisher & Yates, 1957) indicated that at least 8 respondents should have mentioned a pair of facilities as part of a multi-purpose round trip, in order to obtain a reliable indication of the need for a linkage between those facilities, at a satisfactory level of confidence (i.e., 95.0%).

The means available to satisfy a linkage - from the strongest to the most tenuous - may be listed as follows:-

1. Physical proximity - i.e., facilities form part of the same building (Diag. 23);
2. Enclosure in a covered mall - i.e., the linkage requires weather-exclusion. This may further be subdivided into:-
   a. Sharing the same address for prestige purposes;
   b. Locating within sight of each other (Diag. 23);
   c. Locating within walking distance of each other (Diag. 23).
3. Formation of a complex of facilities in the open air, in a square or other courtyard layout, to allow facilities to:-
   a. Share the same or similar address, for prestige purposes;

   b. Locate within sight; or

   c. Within walking distance of each other (Diag. 23); or

   d. Within cycling distance of each other;

   (Note: (a), (b) and (c) in this category are more tenuous here than in category 2 above)

4. Location downtown - in the 'centre' of all known significant locations - for accessibility to the consumer by all available modes of transport;

5. Location within the same quarter, residential area or industrial estate;

6. Location in the same town or city;

7. Location in the same region;

8. Location in the same country. This is significant for manufacturing rather than service activities;

9. Two-way telecommunication terminal;

10. Telecommunication link of various forms.

In this hierarchy of linkage forms, weather-exclusion has a significant role to play in the Canadian context. Most of the clusters of facilities suggested in this study could be accommodated in covered malls or geodesic domes of aluminum alloy and transparent plastic. The economics of scale and the current stage in the development of dome and space-frame technology may not make this always feasible. Whenever this feasibility has been proven however, the additional attraction of a covered mall or street, as a community living room should be seriously considered.

These and other means of fostering linkage between interrelated facilities should be considered at implementation stage, after reliable indications of the strength of a linkage have been obtained.

RELIABLE INDICATIONS OF LINKAGE

Throughout this study, response to foreseeable lifestyle changes has been assumed to call for corresponding changes in land-use pattern, in order to allow for convenience and efficiency in the execution of various functions within the built environment. The process of interpreting lifestyle changes into land-use patterns is of paramount significance in this respect and in the interest of obtaining reliable guidance from the consumer, the Ottawa Energy Budgets survey form - Appendix 3 -included three questions about the interrelationship of daily activities in present and foreseeable lifestyles:-

i) Current 'round trips' to various facilities visited over the period of a day, month or year. About 1 of every 2 respondents had developed such round trips for the sake of convenience and economy of time, energy and money. In comparison with (ii) and (iii) below however, these trips involved few facilities and few respondents had more than 3 or 4 'round trips' to suggest (Diags. 11-13);

ii) Pairs of activities convenient to use together. This did not call for any specific location or circumstances to be borne in mind, other than the respondent's personal or family needs and lifestyle. All respondents had filled in some part of the long list of pairs of activities or facilities and a great variety of clusters were derived from the analysis (Diags. 10, 14, 15);

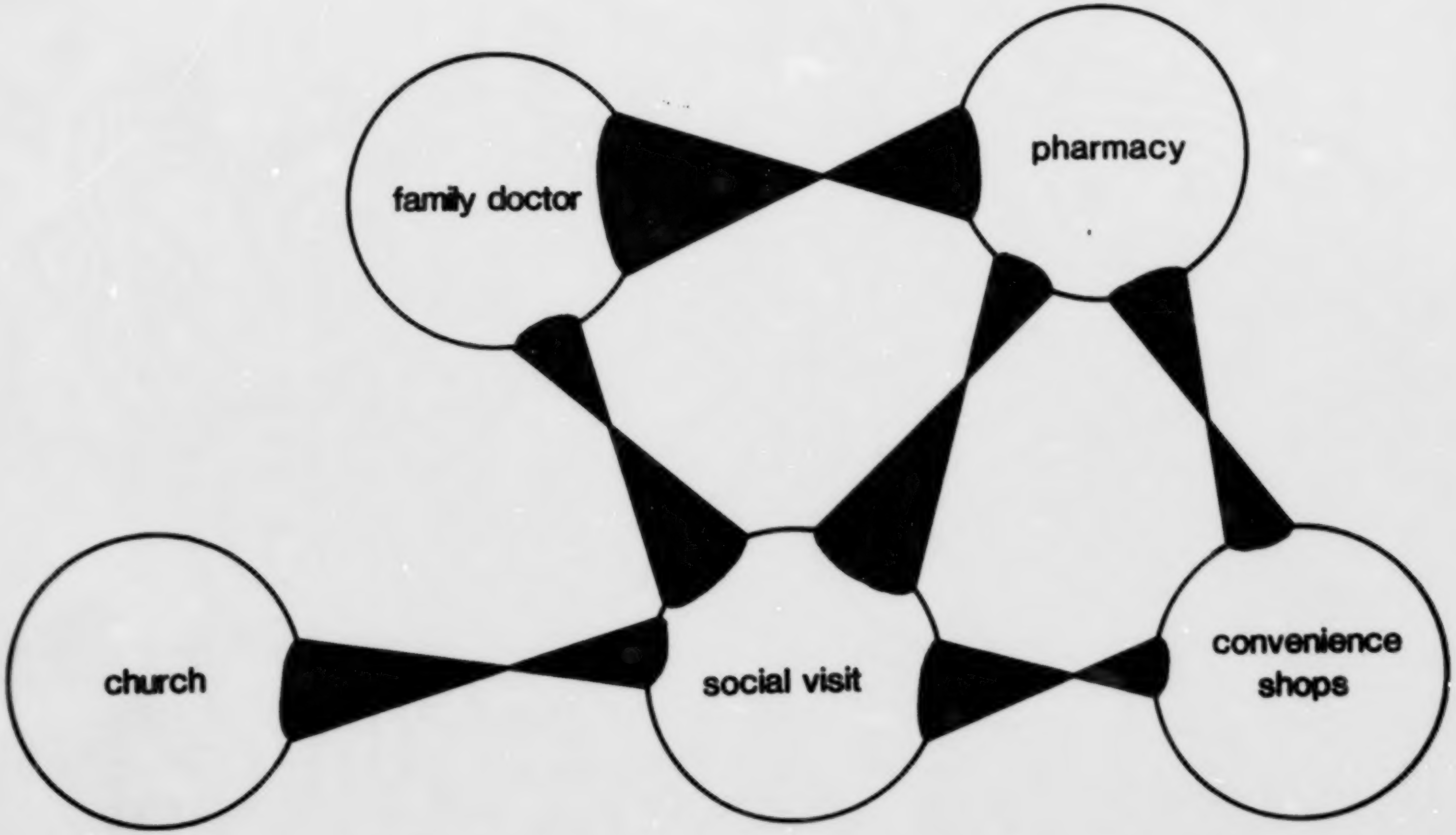
iii) Simulated multi-purpose trips arising out of necessity to economize on gasoline, during the Ottawa Energy Budgets Game. Once more, all respondents had some trip to suggest with the length, variety and number of chains of linked facilities indicated varying according to one's attitude to the conserver ethic. (Diags. 16-20)

PATTERNS OF DISTRIBUTION AND LINKAGE

The interpretation of these three types of suggestions for some spatial proximity between interrelated activities - interrelated by virtue of convenience, sequel of operations, efficiency or any other reason leading to the flow of consumers from one to the other - is explained on Diag. 10 and the accompanying legend. It is important to underline the fact that only the statistically very significant clusters of facilities, acceptable at a confidence level of 99.5% have been shown in Diags. 11-20. At lower levels of signficance, larger and more complicated clusters would be obtained and some links might require a relationship other than spatial proximity between some of the facilities in a cluster.

The simulation of multi-purpose trips provided the opportunity to project clusters from their existing state to a possible development by 1992. By that date, these 'future' clusters suggested three levels of viable distribution of facilities:-

a. Locally accessible clusters or isolated facilities. These might be within walking or cycling distance from the majority of homes in the area they serve, to satisfy recreational, educational, cultural, convenience shopping, health and similar basic needs. The typology and size of these facilities would depend on the socio-economic structure of the population served. This variability of provision for


family doctor
pharmacy
church
social visit
convenience shops

18

Simulated Multi-purpose Trips in an Inner Suburb Neighbourhood particular lifestyles and socio-economic conditions is shown by the contrast of Diags. 16 and 17. The minimum number of activities involved at 'local centre' level may be shown as a simple diagram (Diag. 18), but there appears to be considerable scope for variation beyond this minimum to serve various lifestyles as shown on the following table:-

Table 19: LOCAL CLUSTERS OF FACILITIES
(Figure in brackets indicates statistical confidence level of linkage other than 99.5%)

Family Doctor
Dental Facility
Pharmacy
Clinic (95%)

Church
Community Centre
Library
Convenience Shops
Secondary School (95%)

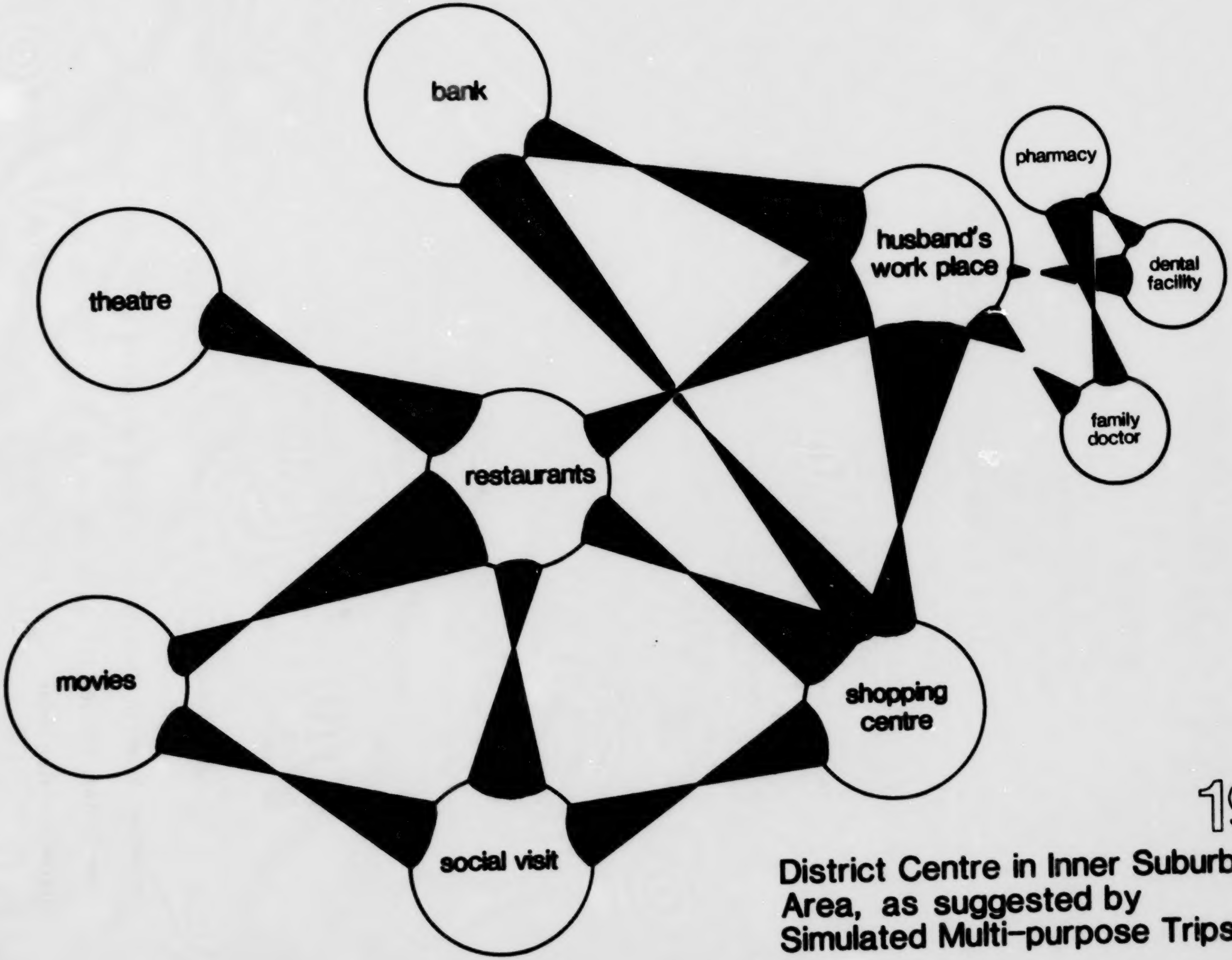
Clubs/Societies (95%)
Park/Play Area
Tennis Court (90%)
Swimming Pool
Sports Arena (95%)

Convenience Shops
Pharmacy
Clinic (95%)
Wife's Workplace
Bingo Hall (95%)

Primary School
Play Area/Park
Kindergarten (95%)
Daycare (95%)
Convenience Shops

b. Community and district centres of a variable size and composition. These may be accessible by private or public transport (in some cases, Rapid Transit) and provide a wide scope for multi-purpose trips - a single journey for example, could satisfy the family's retail, entertainment, cultural, health and perhaps even social visiting needs for a week. The variable content of facilities shown on Table 20 indicates that a population between 15,000 and 60,000 may be served according to geographical location on the transport network and the number of specialized facilities attracted. The latter depends on the socio-economic characteristics of the people served - whether resident in the vicinity of the centre, or attracted from other communities (Diag. 19).

The mention of social visiting needs for a family arises from the fact that in many multi-purpose trips simulated by respondents, a visit to a friend was usually included - perhaps to incorporate a rest after the shopping expedition.


bank
pharmacy
husband's work place
dental facility
theatre
family doctor
restaurants
movies
shopping centre
social visit

19

District Centre in Inner Suburban Area, as suggested by Simulated Multi-purpose Trips

Table 20: DISTRICT CENTRES FOR VARIOUS COMMUNITIES
(Figure in brackets indicates statistical confidence level of linkage other than 99.5%)

Workplaces
Bank
Restaurant
Sports Arena (95%)
Bowling Alley (95%)
Husband's Workplace
Bank
District Shopping Centre
Movies
Theatre (90%)

Hospital
Clinic (95%)
Dental Facility
Family Doctor
Pharmacy
Restaurant
Convenience Shops
Wife's Workplace (95%)
Daycare/Nursery

c. A large downtown complex of facilities. This would be accessible by private or public transport, particularly Rapid Transit. It would provide the widest scope for multi-purpose trips over an entire region, from which a varied clientele would be drawn at least once a month, to satisfy specialized needs in business, administration, education, finance, professional services, culture, entertainment, quality shopping, recreation, health and welfare. As always, but perhaps even more evidently in the coming decades, the downtown complex of facilities will be the point of dissemination of innovations and the hub for the generation of change in lifestyles over a region.

The complex of facilities shown on Diag. 20 indicates the least number of activities for a city of about 300,000 people and Table 21 below, shows possible options for extension. Depending on the location of other regional centres in an area, the market served by a downtown complex of this size may extend from 750,000 to 1,000,000 people.

Table 21: OPTIONAL FACILITIES IN A DOWNTOWN COMPLEX

Federal Ministry
Provincial Ministry
Regional Government
City Hall

University
Art Gallery
Museums
Specialized Libraries

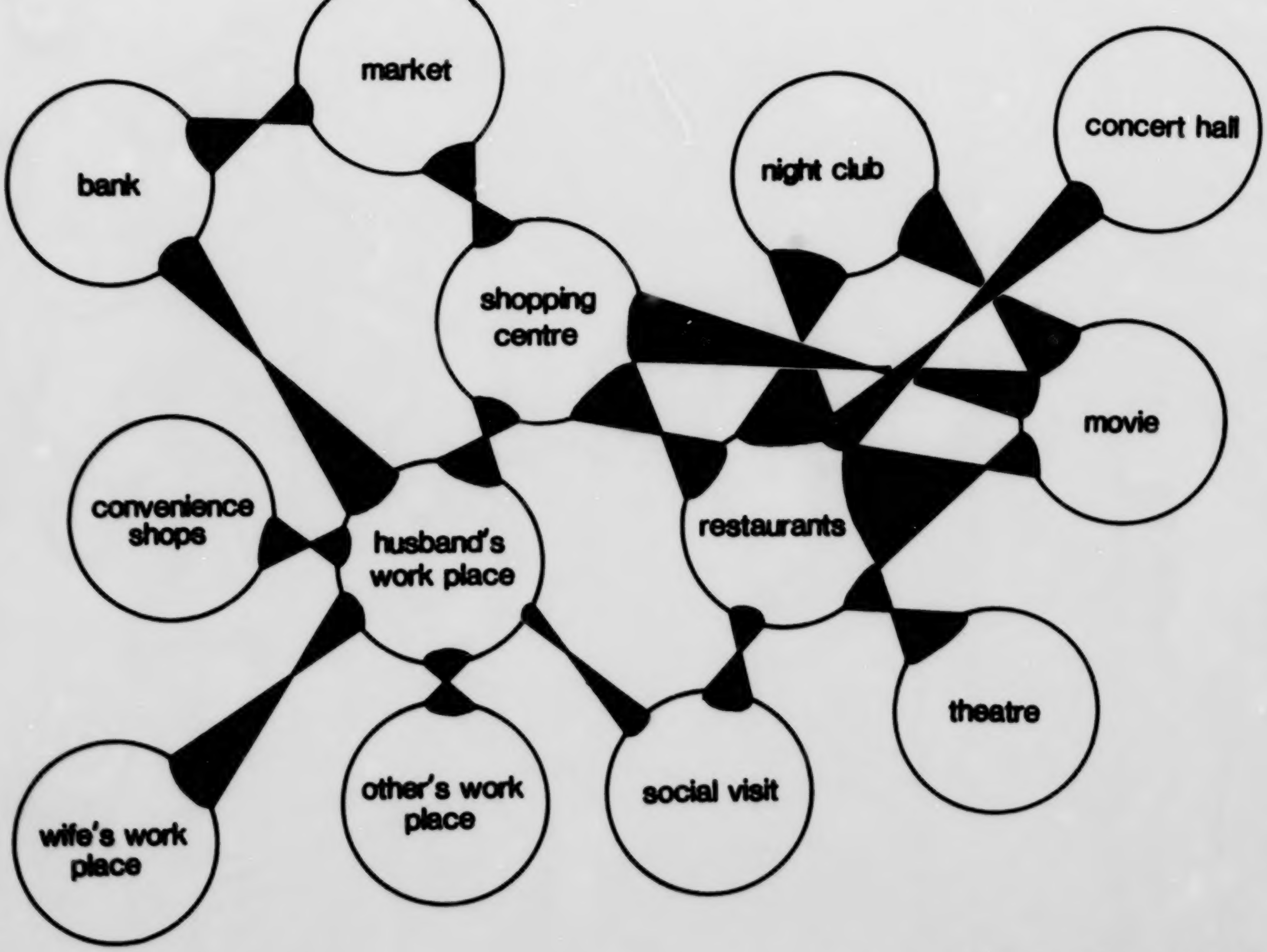
Zoo
Botanical Gardens

Professional Services
Finance Institutions
Consultancies
Business Head Offices

Courts of Justice
Legal Services
Remand Facilities

Research Laboratories
Teaching Hospital
Experimental Stations

The method by which the patterns of distribution and linkage of facilities shown in (a), (b) and (c) may be implemented in an existing urban area will be discussed later under 'Impact on Planning Process'. As regards the hypothesis


market
bank
night club
concert hall
shopping centre
movie
convenience shops
husband's work place
restaurants
theatre
wife's work place
other's work place
social visit

20

Downtown Complex Suggested by Simulated Multi–purpose Trips which was the first step towards the formulation of questions on the patterns of distribution and linkage of these facilities - see Table 10 in Section 3 - it may be considered to have been substantially confirmed by the diagrams of current, suggested and simulated clusters shown on Diags. 10-22 and in Tables 19-21 in this Section. The ranking of urban facilities by frequency of interactions may be a factor worth considering in the formulation of clusters and it is shown on Table 22.

Table 22: RANKING OF URBAN FACILITIES IN 'FREQUENCY-OF-INTERACTIONS' ORDER

'Frequency of interactions' = Number of times a facility formed part of a multi-purpose trip suggested by the respondents to a survey.

ACTIVITY/FACILITY	FREQ'CY	RANK	ACTIVITY/FACILITY	FREQ'CY	RANK
Restaurant	231	(1)	Concert Hall	63	(21)
Shopping Centre	152	(2)	Dentist	62	(22)
Social visiting	117	(3)	Best friend	60	(23)
Work (his)	108	(4)	Club/Society	54	(24)
Bank	103	(5)	Daycare/Nursery	53	(25)
Movie-going	96	(6)	Canal	52	(26)
Convenience shops	87	(7)	2nd best friend	51	(27)
Pharmacy	82	(8)	Sports arena	50	(28)
Market	81	(9)	Community College	48	(29)
Work (hers)	80	(10)	Night club	47	(30)
Library	78	(11)	Clinic	46	(31)

Hospital	77	(12)	Cottage	44	(32)
Museum	74	(13)	Bowling alley	43	(34)
Swimming pool	73	(14)	Sibling's workplace	42	(35)
Theatre	71	(15)	Bingo hall	40	(36)
Art Gallery	70	(16)	Golf course	35	(37)
University	68	(17)	Sailing base	32	(38)
Provincial Park	66	(18)	Race track	28	(39)
Church	65	(19)	Bot. Gdns (Exp. Farm)	21	(40)
Family doctor	64	(20)			

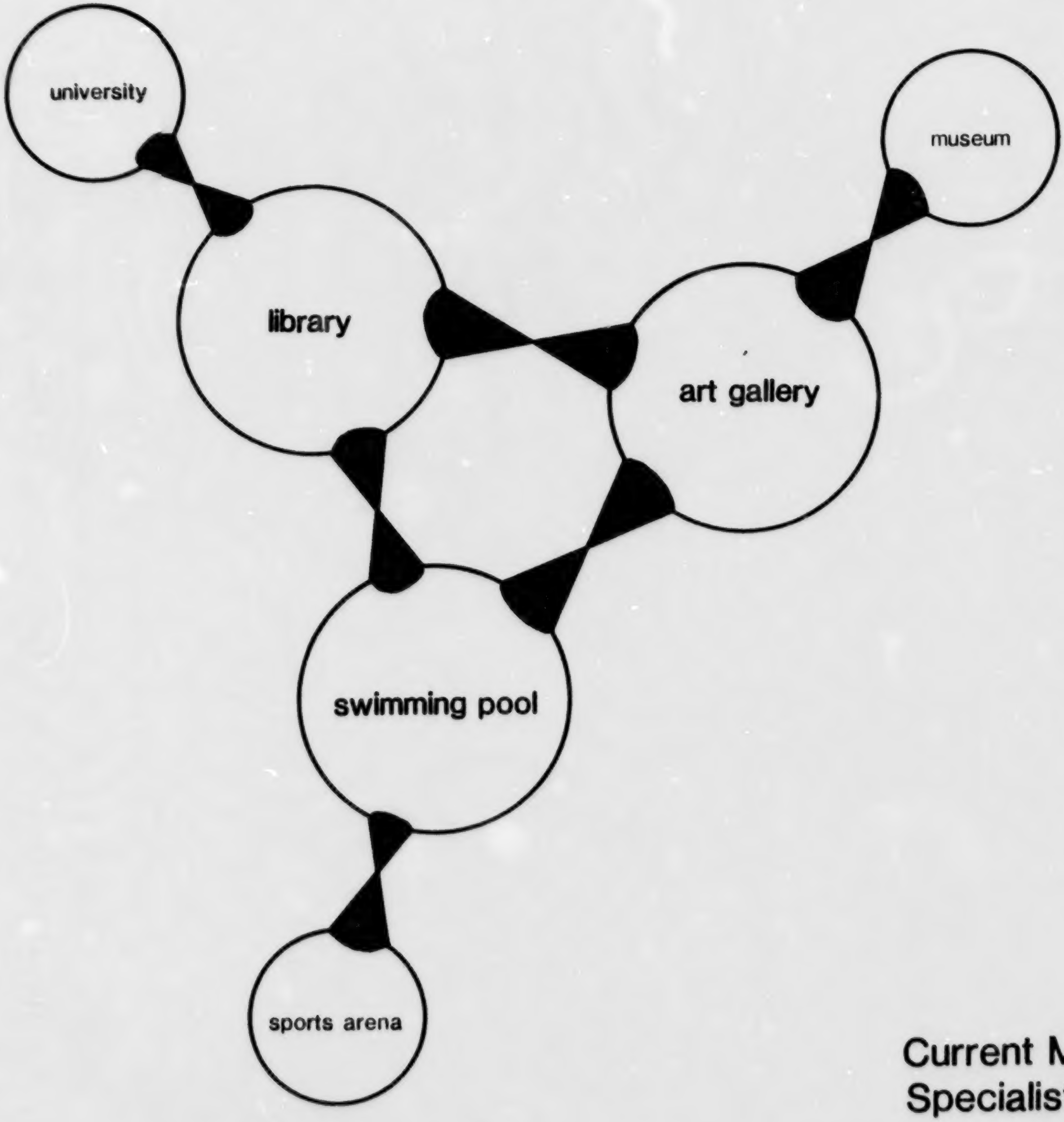
THE TRANSPORT NETWORK

While the linkage between facilities in a cluster may be affected through pedestrian flows within malls, squares, courts, plazas, etc., (Diag. 23), at the broader scale of a city, the transport network will continue to be the means for the exchange of goods and people between various centres. The growing importance of telecommunications throughout the 1980's may affect the volume of traffic on these networks, but there was no evidence whatsoever in this survey to suggest that it will make them entirely redundant.

The only new network assumed to appear in the City of Ottawa during the study period was the Rapid Transit route (1983-1991) - see Diagram 24. The reliance placed on this means of transport by the respondents reinforced the projections for increased ridership made by the specialists in the SYMPOSIUM - see separate volume. Moreover, it would appear evident that whether energy becomes a crucial or secondary factor during the 1980's, the Rapid Transit network will tend to increase the attracton of all locations where stops or stations are to be located. It would be safe therefore to presume that all major intersections of the existing road network with the new Rapid Transit route on which stations are to be located, will assume greater significance than at present. These points could serve as nodes for the location of new, or the enlargement of existing community centres.

SPECIALIZED DISTRICT CENTRES

The opportunities for major development and revitalization likely to arise at these nodes, coupled with the industrial and commercial growth related to the growing high technology industry in the Ottawa-Carleton Region, could be channelled towards the creation of specialized district centres, an existing example of which is shown in Diag. 21. A new specialized centre would consist of functionally interrelated manufacturing and service industries related to a particular product - computers, semi-conductor products, telephone equipment, etc. - which have been assembled in the vicinity of a Rapid Transit station, in order to attract employment of particular skills from all parts of the region. Service facilities for the daytime as well as the resident population of these district centres will automatically follow the establishment of these industries around the station and a specialist growth pole would tend to be created. The advantage of the development of such poles as regards energy efficiency in a city is not dissimilar to that of the creation of clusters of interrelated facilities:- selective attraction of consumers and skills for a range of interrelated purposes; provision of a range of complementary services extending the scope for multi-purpose trips; and production of a range of complementary goods which can be assembled into a valuable consumer product - e.g., a personal computer - without much vehicular travel or transport, because all these services and manufacturers are spatially and functionally close,


university
library
museum
art gallery
swimming pool
sports arena

21

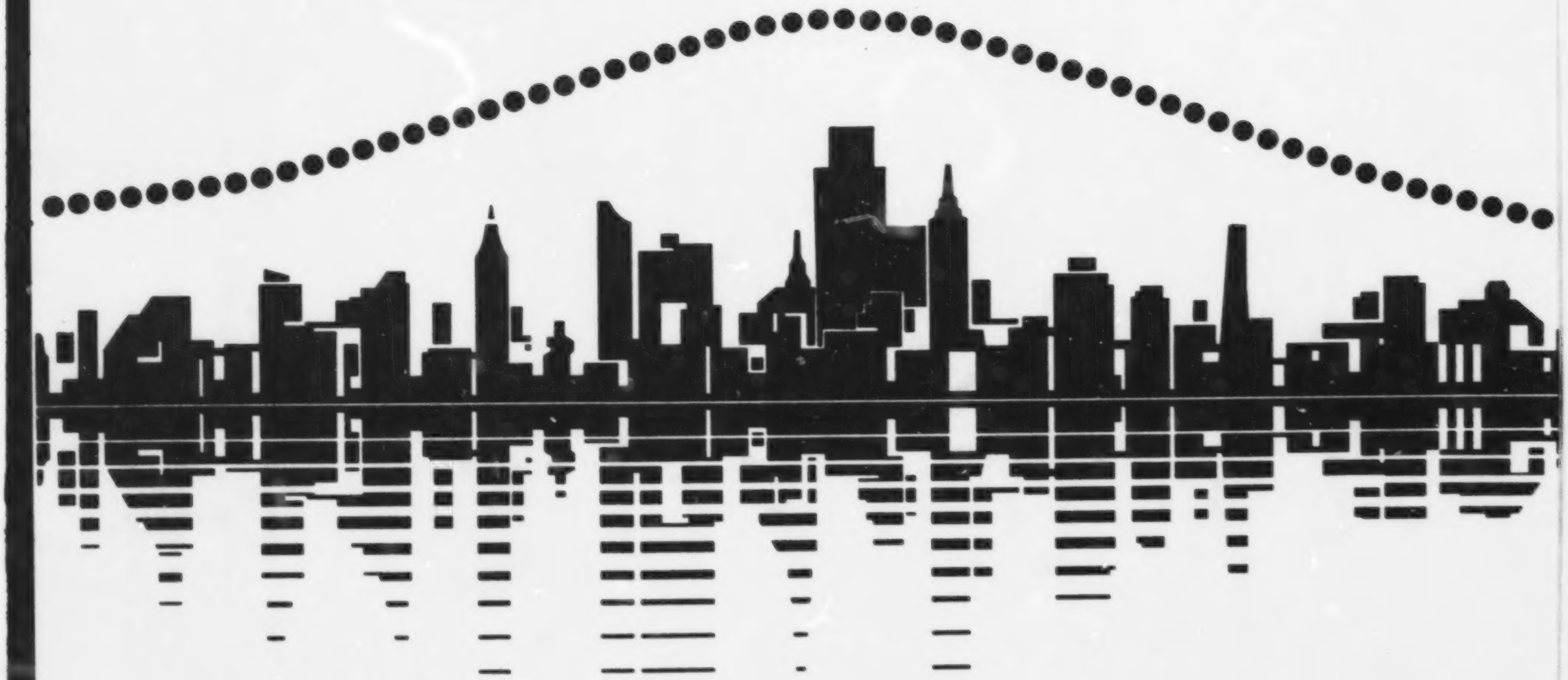
Current Multi-purpose Trips in a
Specialist Centre - University

being located in the same district centre. In the context of an entire city, a series of such specialized poles of attraction will tend to disperse traffic loads instead of allowing excessive congestion to occur in a centralized downtown area, where all specialized elements may have unwittingly been allowed to gravitate.

The intensity of activities as well as the density and height of development in a specialized district centre will tend to assume the profile of a distance-decay curve centred on the Rapid Transit stop as shown on Diag. 22. The concentric pattern of transport, service, work and residential rings around a station, has been called 'transit zoning' in the United States.

THE RESIDENTIAL ENVIRONMENT

The moderate increases in new housing projected at the Symposium, coupled with the growing localization of employment at home, will tend to make the existing housing stock more worthy of renovation and revitalization. Many respondents in the survey availed themselves of the grants available for these purposes and there was considerable evidence to support the projection made by the housing specialist at the Symposium, to the effect that an advanced renovation technology could be expected to grow during the 1980's. New housing, built to high standards of energy efficiency and design, but located in low density pockets in inner and outer suburbs is likely to be always in demand however, because existing housing is likely to increase considerably in density, particularly near Rapid Transit stops and clusters of facilities. This increase in density will be due partly to the change in the concept of privacy from spatial to informatic terms and largely to infilling of existing residential areas, to increase energy efficiency in the City. The density



22

City Director Silhouette

contrast between existing and new housing areas may therefore be considerable and the expectation of barricades between them, suggested by the housing specialist at the Symposium, might become a reality, unless local lifestyle, traditions and public opinion are thoroughly considered, before the adoption of a residential density for an area, to give it character and identity among others.

The localization of employment in residential areas is not likely to be uniform in all residential areas. Low density areas inhabited by high income and highly educated households are more likely to contain telecommuters, home occupations, small consultancies and personal service professionals. Residential locations which are highly accessible by bus or private transport are also likely to contain many work-homes with consultancies and personal service professionals. Doctors' and dentists' surgeries, company branches for data analysis and distribution to telecommuters and other half-way work centres to minimize travel time and expense will also be attracted to such locations. Home occupations related to tertiary (service) and quaternary (informatics) activities may therefore be expected to grow substantially in all residential areas during the study decade, particularly if employers decide to encourage the trend, as a result of proven increase in productivity, reduction of overheads and energy conservation.

RETAIL FACILITIES

Many 'resilient conservers' participating in the simulation game managed to save considerable mileage by reducing the frequency of shopping and in due course virtually replacing it with teleshopping. Despite this giant evolutionary step in shopping habits however, retail stores could be expected to occupy substantial areas in all the centres indicated in patterns of distribution (a), (b) and (c) earlier in this section. Shopping trips to downtown stores offering quality and durable goods and to regional centres providing mostly durables are likely to continue at variable frequencies to suit a household's pocket. Teleshopping orders given by phone or videophone are most likely to be delivered home by district centre food warehouses. The lowest rung in the hierarchy of shopping - the local convenience shop - will also survive and attract personal visits by nearby residents, though in a considerably automated form. It will consist of several vending machines which will be accessible from the exterior for 24 hours a day, in addition to the present perishable goods counter which will be accessible in daytime, but will be particularly busy in after-work hours in the evening.

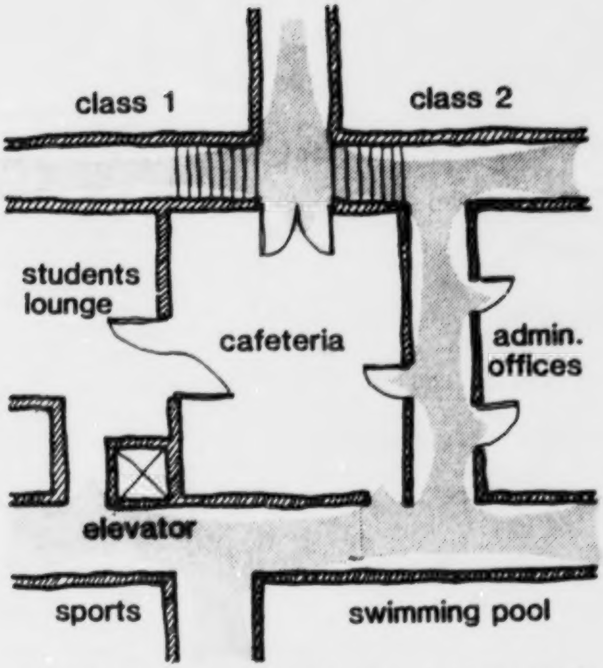
EDUCATION FACILITIES

Primary and secondary school levels will continue to be institution-based, though a substantial part of their curriculum will involve the use of computers and telecommuter training. At higher education and especially post-graduate levels, it is likely to shift considerably to a home base with videotext providing the link to university, community college, library, research laboratory, public data centre, private data banks and educational t.v. stations. This pattern is likely to be valid also for continuing education which is expected to increase considerably, until it becomes the accepted way to adjust to new technology and consequent economic and social developments. In adjusting to these developments, many parents will find that the dissemination of innovations tends to occur increasingly through their numerate and computer-oriented offsprings. Most homes will be equipped with electronic gadgetry and robotics purchased by, or with the advice of the young in the family, to become an enjoyable learning and retraining environment for all.

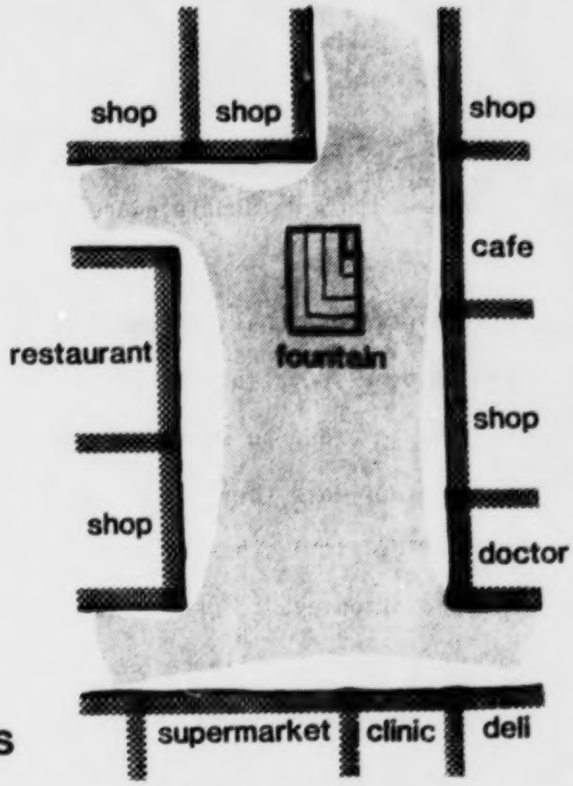
ENTERTAINMENT, CULTURAL AND RECREATIONAL FACILITIES

These three types of facility were the subject of several reductions in frequency of visits by respondents in the early periods of the Ottawa Energy Budgets Game, but as the use of TELIDON and computer terminals increased and respondents became aware of the isolation likely to ensue at home, they became increasingly popular in the final periods of the Game. Flexibility of provision followed by judicious location in easily accessible district centres should therefore be the keywords for managers of these facilities. They should contain at least one multi-purpose space to be made available to all age groups in the community, for social as well as cultural, entertainment or other events. Moreover, they should be associated with interrelated facilities where possible - shopping, library, schools, etc. - in order to benefit from commensalism, the joint appeal to the consumer by reason of functional and spatial association (Hawley, 1950).

Beyond this essential adjustment to the market, the most important development for these facilities is likely to occur in their programme of activities. There will be an increasing reliance on spectacular events and active participation workshops designed to attract audiences away from TV, video substitutes and 'electronic realities' (as they were called by the informatics specialist at the Symposium) at home. The principal 'good' or service to be enjoyed at all these facilities in future will be the 'sense of occasion' - doing something interesting at the end of the working day, something memorable


class 1
class 2
students lounge
cafeteria
admin. offices
elevator
sports
swimming pool

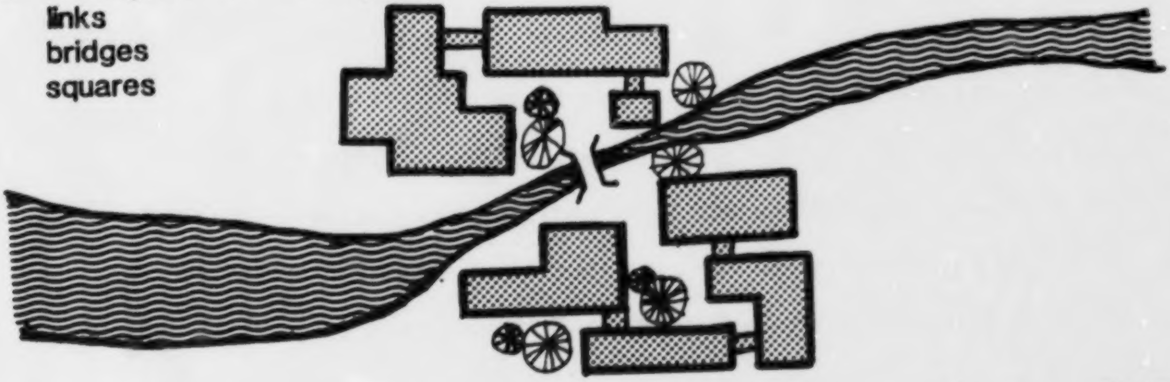
1 Linkages affected through stairs, corridors & elevators


shop
shop
shop
cafe
restaurant
fountain
shop
shop
doctor
supermarket
clinic
deli

2 Plaza or mall for pedestrians

3 Campus or complex

links
bridges
squares



23

SOLUTIONS FOR THE CLUSTERING OF LINKED ACTIVITIES

perhaps, the topic of conversation with friends, but certainly an uplifting experience to make people aware of the quality of life.

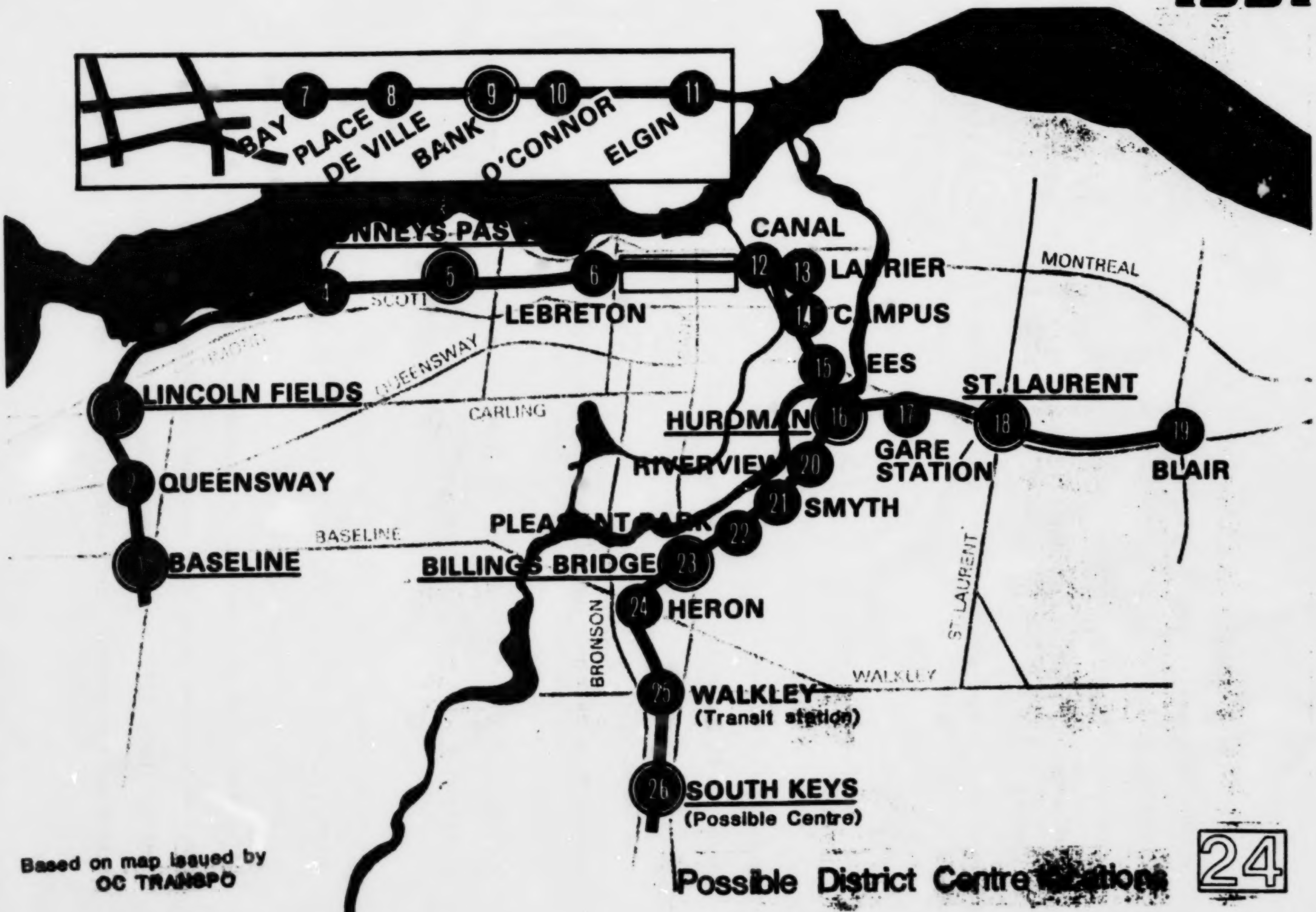
Regional recreational facilities accessible by day or weekend trip will also have to be associated with subsidiary facilities and offer this sense of occasion in order to survive. They should attract people by virtue of the unique experience they can offer the visitor - whether he comes from surrounding cities, nearby regions or far away countries. Nature interpretation events or courses, biological exhibitions, evolution demonstrations by reliance on 3-D television technology and similar educational events for young and old should continually be developed and thoroughly advertised, in order to entice the market for these facilities.

EMPLOYMENT CENTRES

Light manufacturing and service employment sources will tend to be concentrated around transit stops to form the nucleus of district centres. They should be accessible by public as well as private transport, preferably at the intersection of bus, transit and highway routes. Despite the growth of telecommuting, these office and light industrial centres will still attract a large number of workers and the distribution of these employment sources over a number of district centres - rather than allowing them to gravitate downtown for example - will help to keep peak-hour traffic at manageable levels.

Predominantly manufacturing and warehouse employment centres will be the industrial and business parks in the City, located at the intersection of highways and bus routes. Each employment centre, whether predominantly service or manufacturing, should be planned to act as a specialized centre of

1991


7 BAY
8 PLACE DE VILLE
9 BANK
10 O'CONNOR
11 ELGIN
4
5 NNEYS PAS
6 LEBRETON
12 CANAL
13 LAURIER
14 CAMPUS
15 LEES
16 HURDMAN
17 GARE / STATION
18 ST. LAURENT
19 BLAIR
3 LINCOLN FIELDS
2 QUEENSWAY
1 BASELINE
20 RIVERVIEW
21 SMYTH
22 PLEASANT PARK
23 BILLINGS BRIDGE
24 HERON
25 WALKLEY (Transit station)
26 SOUTH KEYS (Possible Centre)
SCOTT
QUEENSWAY
CARLING
BASELINE
MONTREAL
BRONSON
ST. LAURENT
WALKLEY

Based on map issued by OC TRANSPO

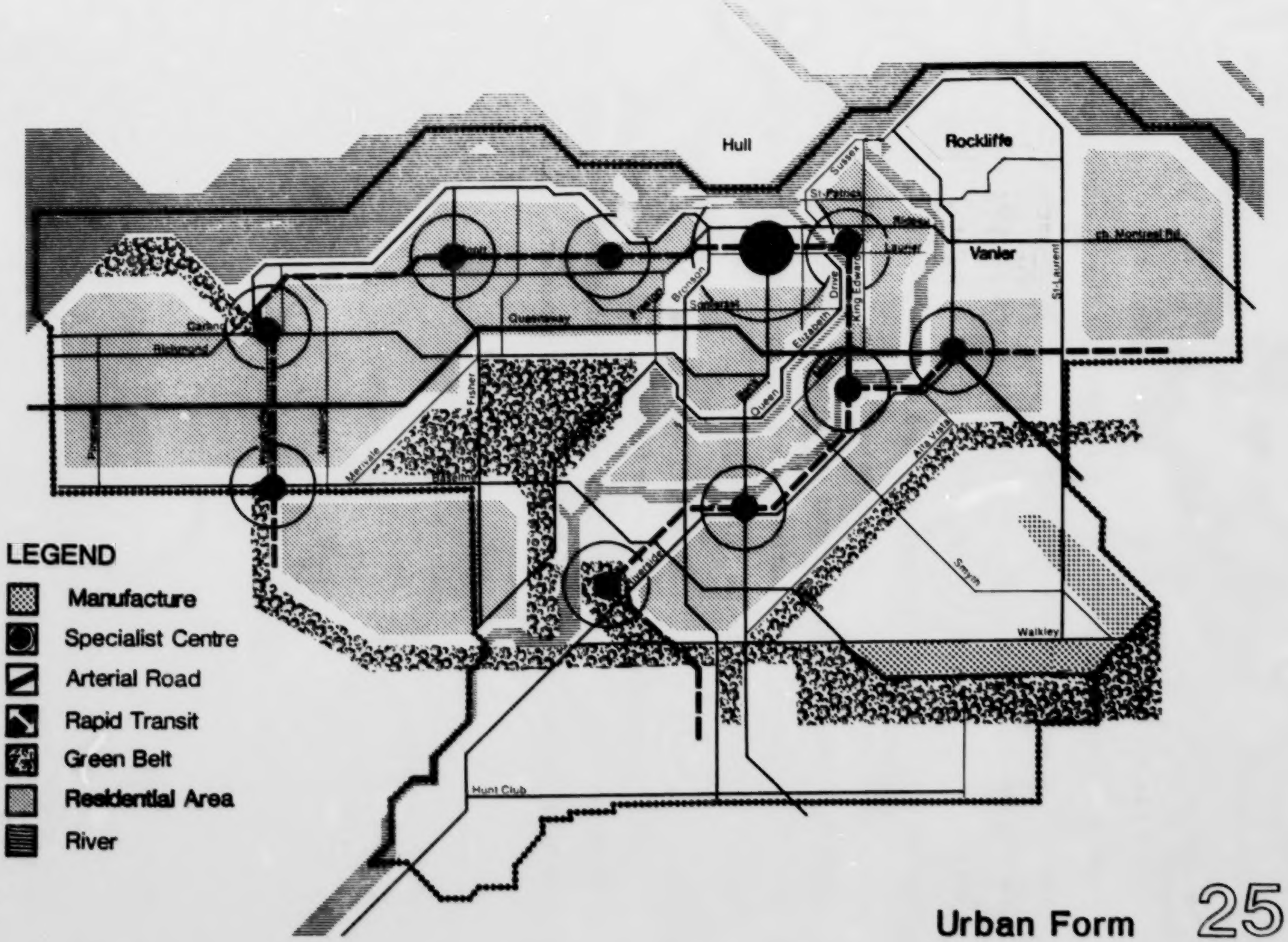
Possible District Centre locations

production - specializing in computer software or hardware, for example, automation components or semi-conductors, appliances or other consumer products. This will require the methodical channelling of industrial development opportunities and their deliberate association with service elements - shopping, recreational and other provision - designed to make the experience of work more wholesome and integrated with life, for the workforce.

URBAN FORM

In view of all these patterns of land use, the most suitable urban form for the Ottawa-Carleton region in an era of uncertainty on energy resources would appear to be the linear city. This was suggested by the urban form and commercial development specialists at the Symposium and it is not far removed from the existing configuration of the built-up area in the region. It is already based on public and private transportation spines and it will be reinforced by the construction of the Rapid Transit route. This form should be expandable on either side of its length, but restricted in lateral sprawl with a designated green belt, as at present.

The novel element in this urban form would be the creation of specialized district centres of which there is already one in existence (Diag. 21) according to multi-purpose trips entered by a significant number of respondents to the Energy Budgets Game. The silhouette of such a centre would approximate the distance-decay curve, as already indicated under 'Specialized District Centres' (Diag. 22). As discussed at the Symposium - see separate volume - others could be created, particularly along the Rapid Transit route - e.g.,


Hull
Rockliffe
Vanier
Sussex
St-Patrick
Rideau
Laurier
ch. Montreal Rd
St-Laurent
King Edward
Drive
Elizabeth
Somerset
Bronson
Queen
Alta Vista
Smyth
Walkley
Hunt Club
Riverside
Merivale
Fisher
Baseline
Queensway
Carling
Richmond
LEGEND
Manufacture
Specialist Centre
Arterial Road
Rapid Transit
Green Belt
Residential Area
River

Urban Form

Baseline, Lincoln Fields, Tunney's Pasture, Hurdman, Billings, South Keys, St. Laurent and, in due course, Orleans, as shown on Diag. 24. In order to maximize convenience as well as energy efficiency for the consumer, a set of interrelated service and employment elements should be concentrated on each of these centres to provide a wide scope for multi-purpose trips related to a function - e.g., entertainment, education, administration, etc. The downtown core would thus attract the most specialized elements which the majority of people would need to visit only on occasion - federal or provincial ministries, specialist shops, gourmet restaurants, concert hall, art gallery, etc. The vocabulary for the satisfaction of linkage between all these elements should continually be extended (Diag. 23).

An abstract representation of the urban form (Diag. 25) is included for the sake of completing the information revealed by this study, through projections made by specialists and expectations simulated by respondents.

GA:smr-3

D2D115

B. THE COMPARISON OF EXISTING AND FORESEEABLE PATTERNS OF LAND USE

The choice of Dalhousie, Capital and Billings wards as the sample area for the selection of households to play the Ottawa Energy Budgets Game (Map 2) was based on the requirement of including in this study a comparison of existing and foreseeable patterns of land use. The existing land uses in downtown Ottawa and the business areas of these three wards were considered a suitable ground for this comparison. They are shown on Maps 26-29 and their typology is summarized on Tables 23-26. The foreseeable patterns of land use, in accordance with the basic assumptions on which they were derived in this study, may be referred to as 'Energy-efficient patterns' and they are shown on Diags 18-20, supplemented with Tables 19-21. It will be noted that the tables referring to existing land use patterns (23-26) indicate several compatible relationships which would allow pedestrian flows between functionally interrelated activities as stipulated by energy-efficient patterns - but there is considerable scope for improvement in this respect. The reasons for this limited compatibility of existing land use patterns will be explained below.

EXISTING LAND USE CHARACTERISTCS

The characteristics of an existing distribution of land uses in most cities today - regardless as to whether they were planned or not - may be summarized as follows:-

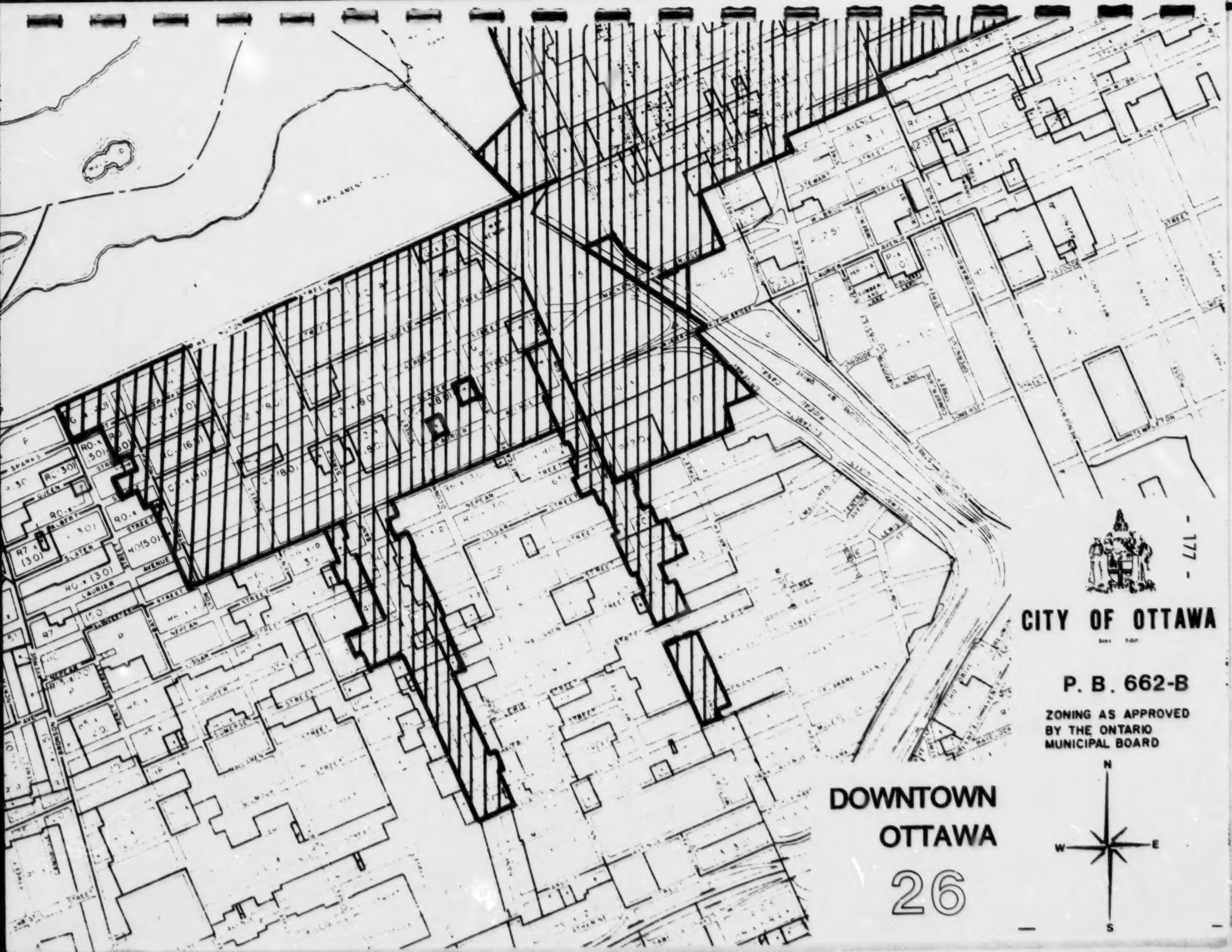
1. Incremental growth: As a city has grown in population and in the context of continuously developing technology, land uses had to be extended into the agricultural hinterland and develop into increasingly specialized uses.
2. Anachronistic pattern: A selected location for a particular use of land, tends to become dated and dysfunctional after some years, because of the continual shifting of other land uses around them due to change in fashion, technology and lifestyles. If all urban facilities were mobile for example - e.g., the chipwagon - their managers would welcome the

Table 23: EXISTING LAND USES IN OTTAWA CENTRAL BUSINESS AREA
(Approximate radius: 2.0 kms)

No. Off	Land Use or Facility	Some adjacent land uses (Compatible* ones underlined)
6	Embassies/Consulates	Commercial offices, Park, Shops/stores
989	Multiple dwellings	Shops/stores, Restaurants, Parks
1	Military barracks	Police station, Commercial offices
26	Boarding houses	Restaurant, Comm. offices, Service station
5	Hostels	Commercial offices, Park, Shops/stores
15	Hotels	Commercial offices, Housing, Shops/stores
3	Nursing homes	Housing, Shops/stores, Commercial offices
54	Association/Institutions	Commercial offices, Fed. gov't. offices
185	Comm. office locations	Shops/stores, Restaurants, Embassies
42	Fed. gov't. offices	Landscaped reserves, Embassy
1	Provincial gov't. office	Restaurant, Bank, Comm. offices, Shops/stores
2	Regional gov't. offices	Comm. offices, Shops/stores, Institutions
2	Daycare/Nursery schools	Shops/stores, Comm. offices
4	Libraries/Galleries/ Museums	Park, Restaurant, Shops/stores, Comm. offices
1	University	Housing, Comm. offices, Shops/stores, Boarding houses
28	Church halls/places of worship	Shops/stores, Park, Boarding house
10	Amusement places	Shops/stores, Restaurants, Comm. offices, Schools
57	Restaurants	Boarding houses, Comm. offices, University, Shops/stores
4	Commercial schools	Take-out restaurant, Shops/stores
1	Regional shopping centre	Restaurants, Tavern, Comm. offices, Bus shelter, Hotel, Conference centre, Shops/stores
4	Taverns/Pubs	Shops/stores, Commerical offices, Bus shelter
2	Auto sales and service	Shops/stores, Hostel, Commercial offices
2	Take-out restaurants	Shops/stores, Amusement place, Commercial offices
143	Retail stores/shops	Housing, Other stores, Restaurants
11	Service stations	Shops/stores, Restaurants, Commercial offices
14	Mech. repair garages	Auto sales agencies, Shops/stores
2	Fire stations	Shops/stores, Commercial offices
2	Law enforcement uses	Hostel, Registry Office, Shopping centre
1	Community Centre	Shops/stores, Park, Private Sports Club
9	Parks	Concert Hall, Restaurant, Courts
2	Private Sports Club	Commercial offices, Bus shelter
6	Recreational facilities	Federal offices, Commercial offices
17	Landscaped reserves	Federal offices, Museum, Courts
19	Bus shelters/stops	Shops/stores, Shopping centre, Commercial offices, University, Housing, Embassies, Hotels, Nursing homes, Nursery school, Library, Gallery, Museum, Restaurant, Community centre

---

* COMPATIBLE land use = One which could be part of a multi-purpose trip, together with the land use considered.



CITY OF OTTAWA

P. B. 662-B

ZONING AS APPROVED
BY THE ONTARIO
MUNICIPAL BOARD

DOWNTOWN
OTTAWA
26

chance to move them every now and then. Evidently the need for mobility would be very different for various types of facilities between say, the Houses of Parliament on one land and the chipwagon on the other.

3. Haphazard distribution and displacement: All land uses which represented an innovation at some point in a city's development - e.g., the sale of personal computers in Ottawa - have had to be accommodated in the best available location at the time of their arrival. If some displacement could be arranged - e.g., a wallpaper shop in Bank Street being taken over for the sale of personal computers - the location would still be haphazard. The new land use could be located at the optimum location for its function only with great difficulty, a lot of capital outlay and even some political pressure.

These characteristics are inherent in any situation of cumulative and gradual development and lead to organic growth which is often an attribute of the City, particularly if it is visually evident in the varying architectural styles of buildings in a street. Organic growth and dynamism, as attributes of a thriving city, require a flexible system of land use to accommodate innovation and change. This need for flexibility seems to be forgotten or deliberately negated however, when land use zoning is adopted at some stage in a city's development for the following overt or hidden objectives (see Goldberg and Morewood, 1980):-

a. "To protect health, safety, convenience, security and public welfare."

b. "To protect property values, to better the 'public good', to preserve city character from rapacious developers."

c. "To ensure majority control over land use."

Most of these arguments could be seen to be based on antiquated concepts of industry, society and security in favor of class distinction and conservatism - i.e., the need for stability and economic protectionism to preserve the status quo. Opposing views to land use zoning are also given in the above-mentioned reference, as follows:-

i. Zoning is based on the faulty premise that planning is a static end-concept of land use control; It is in contrast with the reality of dymamic urban growth;

ii. It is inflexible and when exceptions are made, it takes 6-8 months to amend an ordinance;

iii. It tends to dominate the entire planning function which is supposed to be a forward-looking rather than a policing operation;

iv. It tends to impede progress, innovation and economic growth in the city, by increasing the inertia in favour of the status quo;

v. Zoning impedes the renovation of decaying areas and the creative revitalization of heritage districts;

vi. Zoning creates legislative inequity, perpetuates monopolies and opens the door to corruption.

While all these arguments may be advanced on theoretical grounds, the practical reality in the Ottawa-Carleton Region, as revealed by the specialist on urban form at the Symposium - see projections on Urban Form in the SYMPOSIUM volume - is that "zoning is breaking down" and in the conditions of accelerating growth in this region, it was least likely to continue as a viable planning instrument. Any constructive change or new system however, should preserve the following characteristics of zoning:-

a. Avoid the juxtaposition of land uses which are objectionable from the point of view of health, safety, security and public welfare;

b. Better the 'public good' and preserve city character;

c. Ensure majority control over land use.

Incorporating these features into a new system should not imply segregation, inflexibility and antagonism to developers and to investment in the city in general. It should be open-ended and co-operative rather than a closed and competitive system.

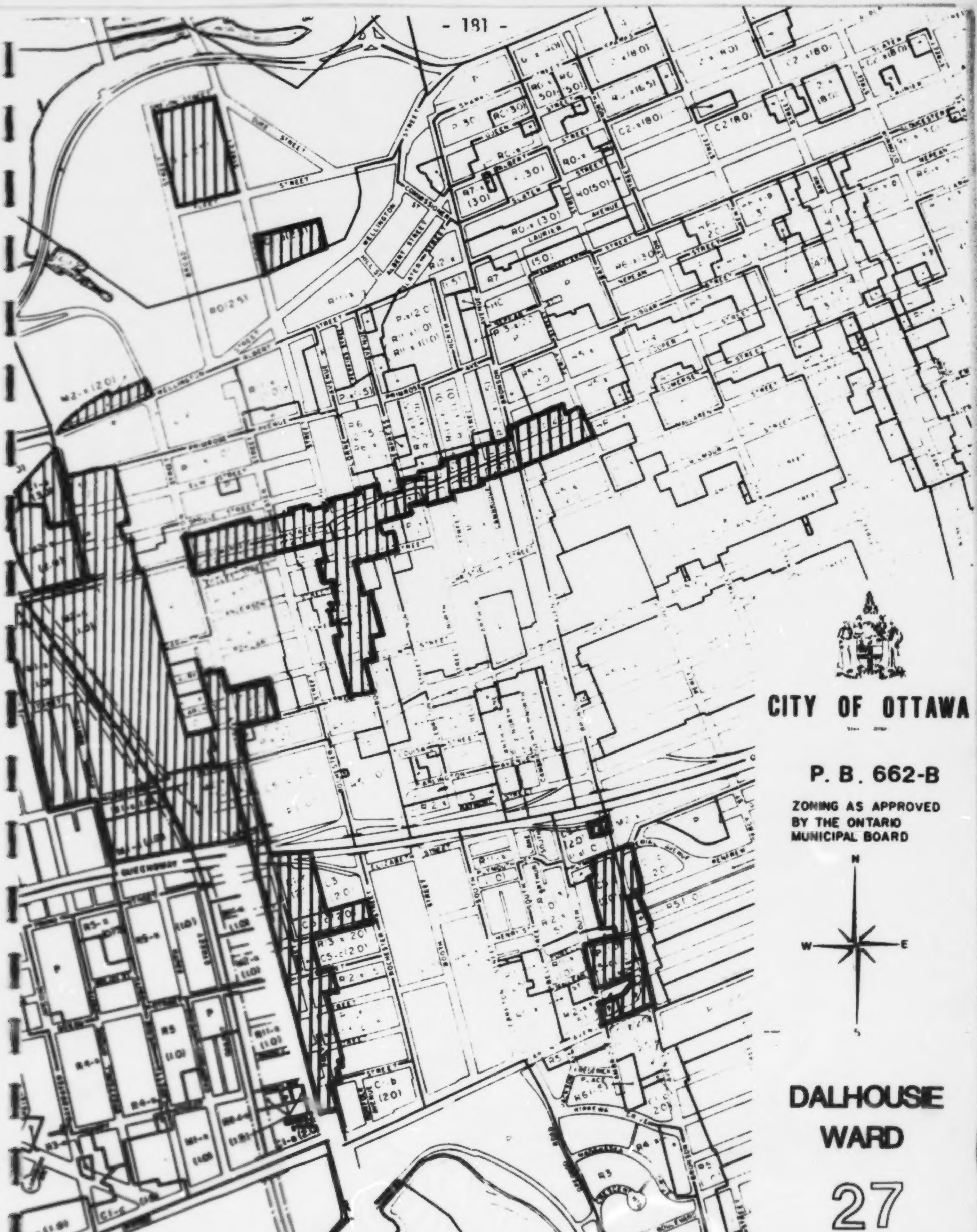
The same plea for co-operation between public authority and private developers could be made in the location of services and their integration in commercial development. At present, the public sector builds facilities like libraries, community centres, swimming pools, sports arenas, etc., in isolated lots outside commercial areas, because none of these facilities could be maintained

Table 24: EXISTING LAND USES IN DALHOUSIE BUSINESS AREAS
(Approximate ribbon length = 1.6 km)

No. Off	Land Use or Facility	Some adjacent land uses (Compatible* ones underlined)
363	Multiple dwellings	Shops/Stores, Restaurants, Auto sales
2	Group homes	Housing
2	Boarding houses	Housing, Service Station, Shops/Stores
3	Hotels	Housing, Shops/Stores
9	Institutional Offices	Commercial offices, Housing, Shops/Stores
14	Fed. Gov't offices	Housing, Landscape reserve
1	Local Gov't office	Housing, Shops/Stores
1	Regional Gov't office	Housing
5	Places of amusement	Housing, Shops/Stores
8	Wholesale warehouses	Shops/Stores, Housing
1	Laboratory	Comm. offices, Housing
6	Electric sub-stations	Housing
28	Commercial offices	Housing, Shops/stores, Restaurants
1	Library	Auto sales agency
1	Community centre	Church, Housing
3	Separate schools	Housing
1	Sports club	Housing
1	Day care centre	Housing, Shops/Stores
1	Hospital	Housing, Shops/Stores, Comm. offices
10	Places of worship	Housing, Community centre, Shops/Stores
1	Public school	Service station, Housing, Stores/Shops
1	Pharmacy	Stores/shops, Public school
1	Cinema	Commercial offices, Stores/shops, Service Station
2	High schools	Housing, Park
10	Restaurants	Shops/stores, Housing, Library, Commercial offices
2	Take-out restaurants	Shops, Commercial offices
2	Pubs/taverns	Stores/shops
28	Stores/shops	Other stores/shops, Service stations, Cinema, Parks/taverns, Auto sales
19	Mechanical repair shops	Housing
12	Service stations	Stores/shops, Cinema
5	Auto sales agencies	Library, Shops/store
15	Manufacturing plants	Housing
3	Bus shelters	Housing, Shops/Stores

---

* COMPATIBLE land use = One which could be part of a multi-purpose trip, together with the land use considered.


WELLINGTON
ALBERT STREET
SLATER
LAURIER
AVENUE
QUEEN
SPARKS
COMMISSIONER
NEPEAN
QUEENSWAY
ELIZABETH
BOOTH
ROCHESTER
RENFREW
N
W
E
S

CITY OF OTTAWA

P. B. 662-B

ZONING AS APPROVED
BY THE ONTARIO
MUNICIPAL BOARD

DALHOUSIE
WARD

27

Table 25: EXISTING LAND USES IN CAPITAL WARD BUSINESS AREA
(Approximate ribbon length = 2.2 km)

No. Off	Land Use or Facility	Some adjacent land uses (Compatible* ones underlined)
6	Embassies	Housing, Parks
106	Multiple dwellings	Housing, Shops/stores, Park
3	Group Homes	Housing
3	Institutions	Housing
4	Nursing Homes	Housing, Shops/stores
21	Commercial offices	Shops/stores, Restaurants
1	Local government office	Shops/stores
36	Retail shops/stores	Shops/stores, Housing
2	Separate schools	Housing
2	Libraries	School, Housing
1	Cinema	Commercial offices, Shops/stores, Service station
1	Public schools	Housing, Shops/stores
1	Hospital	Housing
6	Churches	Shops/stores, Housing
4	Amusement places	Shops/stores, Housing, Restaurant
6	Restaurants	Shops/stores, Amusement places, Commercial offices
1	Convent	Housing, Library, Shops/stores
5	Auto sales agents	Shops/stores, Restaurants
3	Take-out restaurants	Shops/stores, Commercial offices
6	Service stations	Shops/stores, Restaurant
3	Electric generating plants	Housing
2	Community centres	Housing
1	Sports club	Housing
1	Sports ground	Housing
8	Bus shelters/stops	Shops/stores, Housing
4	Parks	Housing, Embassy
1	Bingo hall	Auto sales agency, Restaurant

---

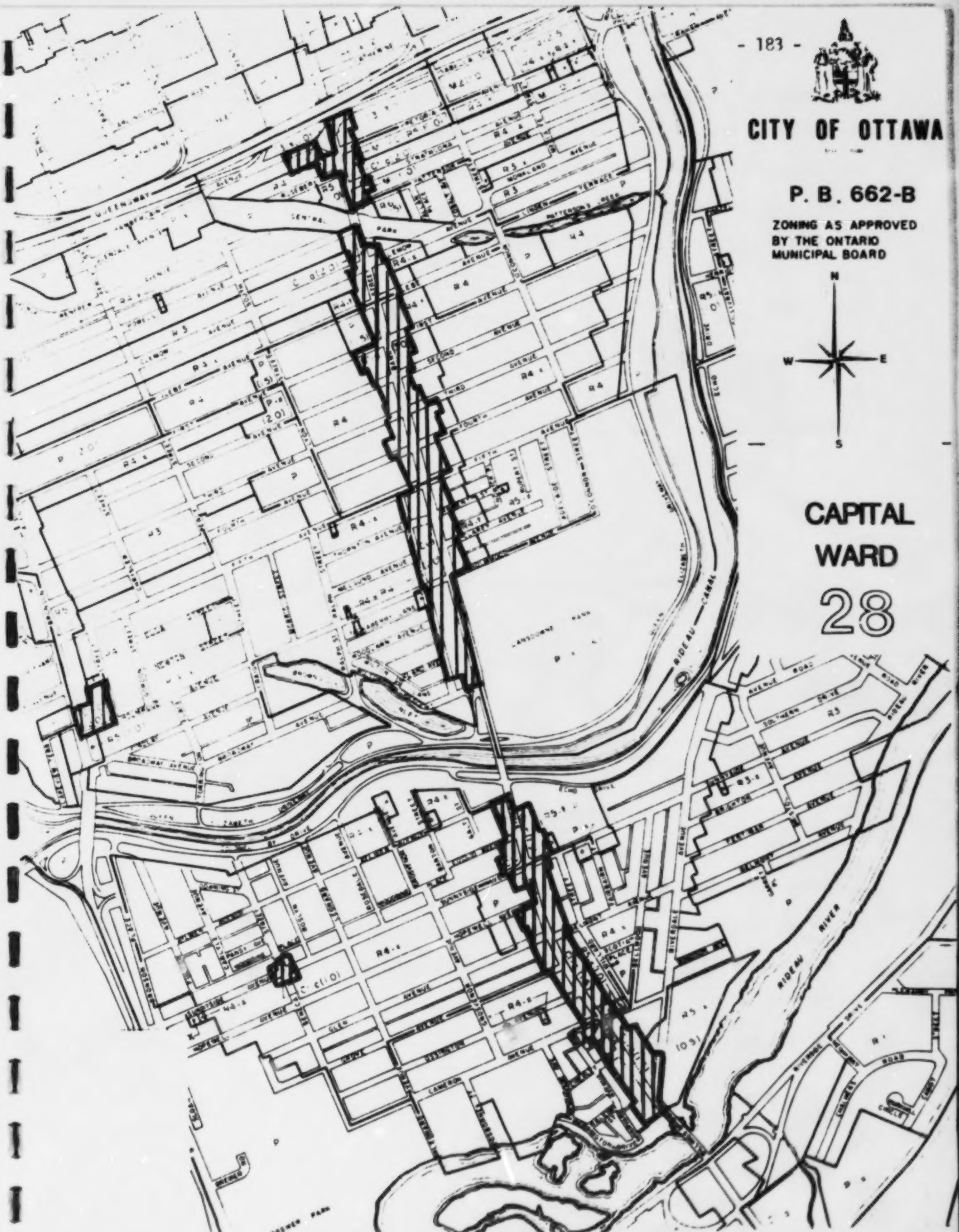
* COMPATIBLE land use = One which could be part of a multi-purpose trip, together with the land use considered.

CITY OF OTTAWA

P. B. 662-B

ZONING AS APPROVED
BY THE ONTARIO
MUNICIPAL BOARD

CAPITAL
WARD
28


N
W
E
S
QUEENSWAY
CENTRAL PARK
LANSDOWNE PARK
RIDEAU CANAL
RIDEAU RIVER
BREWER PARK
R4
R3
R5
P
C

if commercial rents were to be paid. The developer building a commercial mall on the other hand, will never contemplate incorporating a public library or health clinic, because he is eager to get the highest possible rent for every square foot of his development. From the point of view of the consumer however - a housewife, for example - it would make eminent sense to buy food, visit the clinic, return library books and leave a child in a crêche while having coffee with a friend in a snack bar - all under the same roof. Urban planners should come forth with creative solutions and land use management systems to allow positive intervention in all similar situations where the consumer's convenience seems to have been neglected.

ALTERNATIVES

Mixed land use development is increasingly favoured in recent years and it is certainly the pattern that invariably arises in dynamic cities, open to change and innovation. Land use management systems which have been devised to encourage mixed land use may be enumerated as follows:-

1. Structure planning: Initiated in Britain in the early 1970's, this system aims to minimize rigidity at the scale of the entire city. A Structure Plan shows only the lines of infrastructure and the broad disposition of land for various functions around the structural framework formed by these lines. Individual areas could be selected for the preparation of Detail and Action Plans in response to development pressures in them, without the hurdle of having to change any zoning to suit the current or foreseeable situation.

2. Planned Unit Development (PUD): Initiated in USA in the 1960's, this system allows a developer considering the purchase or owning a parcel of land to propose a mixture of residential and other land uses at a density and layout which the planning authorities will approve, after ensuring that health, safety, security and the 'public good' have in no way been compromised.

3. Private Development Agreement: An alternative to PUD, this agreement allows the planning authority to insert conditions designed to ensure 'the public good', in a proposed private development. An eminent example is the agreement between the City of Ottawa and the Campeau Corporation to include 15,000 sq. ft. for public health and community services in South Keys shopping centre, which is the planned district centre for the growing Greenboro community in the City.

4. Bonus zoning and other incentives: Conformance to a guideline issued by a planning authority aiming to ensure a public benefit earns the developer a bonus in terms of zoning some part of his land for a higher density or otherwise more profitable use. The Solar Design Guidelines issued by the City of Ottawa for example, will allow the incorporation of commercial or light industrial uses in a city block, on which the developer proposes to build within the pyramidal 'solar envelope' for the site, in order to protect solar access to neighbouring blocks. Alternatively, if he incorporates an indoor plaza within the pyramidal envelope, no open space allocation may be required elsewhere on his project.

Table 26: EXISTING LAND USES IN BILLINGS BRIDGE BUSINESS AREA
(Approximate radius = 0.4 km)

No. Off	Land Use or Facility	Some adjacent land uses (Compatible* ones underlined)
48	Dwellings in tower block	Shops/stores, Pharmarcy
1	Embassy	Housing
1	Institution	Housing
26	Commercial offices	Other offices, Shops/stores, Housing
1	Federal gov't. office	Service station
2	Separate schools	Housing
3	Public schools	Housing
1	Daycare centre	Housing
1	Library	Housing
1	Church	Housing
11	Restaurants	Shops/stores, Commercial offices
1	Shopping centre	Service station, Commercial offices
3	Service stations	Stores/shops, Restaurant
1	Take-out restaurant	Shops/stores
19	Retail stores (dispersed)	Shops/stores, Restaurant, Housing
4	Warehouses	Shops/stores
2	Sports/recreational clubs	Restaurant, Park
1	Community centre	Restaurant, Church
1	Swimming pool	Housing
1	Funeral home	Shops/stores
3	Auto sales agencies	Shops/stores
1	Tavern/pub	Shops/stores
1	Nursery school	Housing

GA:jac-4
D6D057

---

* COMPATIBLE land use = One which could be part of a multi-purpose trip, together with the land use considered.

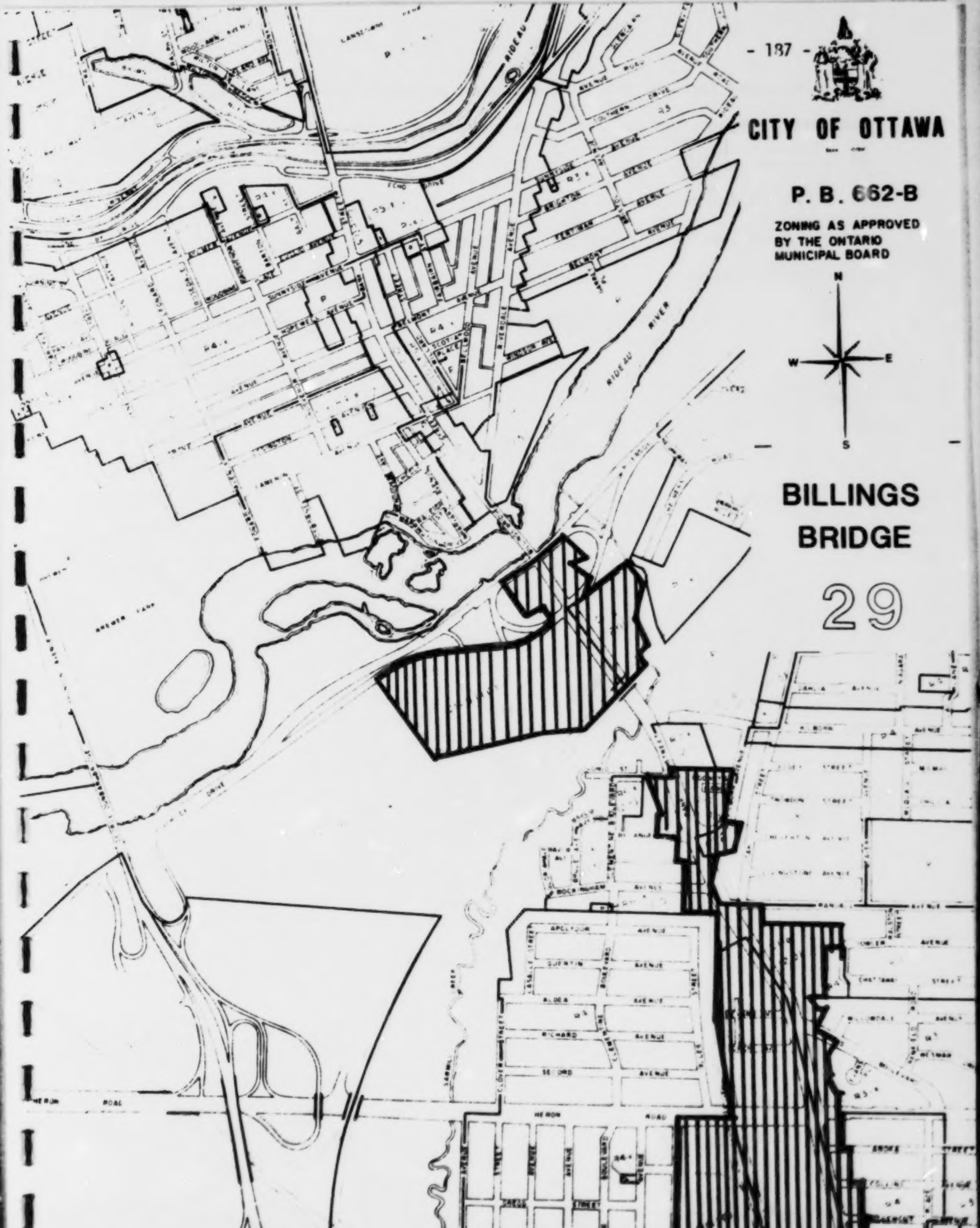
CITY OF OTTAWA

P. B. 662-B

ZONING AS APPROVED
BY THE ONTARIO
MUNICIPAL BOARD

BILLINGS BRIDGE

29


N
W
E
S
RIDEAU RIVER
RIDEAU
SOUTHERN DRIVE
BRIGHTON AVENUE
FENTIMAN AVENUE
BELMONT AVENUE
SUNNYSIDE AVENUE
HOPEWELL AVENUE
SCOTT PLACE
RIVERDALE AVENUE
ECHO DRIVE
BREWER PARK
HERON ROAD
APPLETON AVENUE
QUENTIN AVENUE
ALDEA AVENUE
RICHARD AVENUE
SEYORD AVENUE
BRUCE STREET

These and other forms of private development agreement devised to allow mixed uses near intersections or other nodes suitable for the location of a cluster of facilities would help to promote social convenience and energy efficiency in the City. While the clusters indicated in this study may ensure energy efficiency at least for the decade 1982-1992, the process of implemention to be described in C below will include a method for establishing novel relationships between facilities, as fashions, technology and pedestrian flows between them may change in the future.

GA:cse-3

D2D121

C. THE PROCESS OF IMPLEMENTATION

The process of implementing the clusters of facilities shown on Diags. 18-20 and the supplementary Tables 19-21 at various scales, may be directed towards the following alternative objectives:-

i. Supplementing the variety of downtown facilities;

ii. Adjusting an existing pattern of land uses towards the development of an energy-efficient cluster of facilities at a district centre;

iii. Making an existing neighbourhood or community centre more responsive - i.e., more particular - to the requirements of a local lifestyle;

iv. Establishing socially convenient and energy-efficient patterns of land use, after the period covered by this study - i.e., beyond 1992.

It should be taken for granted that the involvement and co-operation of residents within the area to be served by the projected cluster of facilities is the essential ingredient for a successful planning process. Planners or engineers attempting to predict the frequency of pedestrian or other flows between any pair of facilities may be unwittingly imposing their own precepts, values and lifestyles on the community. The rapid change in fashions and technology for the foreseeable future, allows only an ephemeral validity to mathematical models of linkage between facilities (Armen, 1971).

SUPPLEMENTING THE VARIETY OF DOWNTOWN FACILITIES

The market research necessary to establish the financial viability of providing a new type of facility is beyond the scope of this study. Suffice it to say that the socio-economic characteristics of the residents and visitors of the region over the space of a year have to be considered, together with the competition presented by surrounding cities. The more relevant question is where to locate it, in order to allow people to include visits to this new facility as part of their multi-purpose trips. Automatically, this implies that it should be made part of an existing cluster of facilities, which in the context of a downtown core area means differentiating the most suitable among several quarters. One or all of the following procedures may be used towards this end:-

1. Carry out a survey in which respondents are asked to indicate the time of the day and the sequence of activities in which they would like to 'fit' the new experience (to be offered by the proposed facility);

2. Evaluate the merits and demerits of the locational context in which the proposed facility has been placed in the case of larger cities - perhaps in other countries altogether - already possessing that facility;

3. Install a temporary pavilion and offer the experience of the new activity in a cluster or downtown quarter in which logically or intuitively, the entrepreneur thinks it should fit. Thus, an innovation in entertainment may be associated with other entertainment facilities. Several locational tests may be required, in alternative quarters, before reaching a decision.

The flexibility of space for the expansion of existing clusters or quarters of downtown facilities for the addition of innovations should be sought vertically, as well as horizontally. Location in the 'right quarter' should be considered more important than a ground floor entrance. It will be up to the entrepreneur proposing the new facility, to choose the most appropriate alternative, once the planning authority has agreed on the quarter or cluster in which the new facility should be located.

EXTENDING THE RANGE OF DISTRICT CENTRE FACILITIES

In a growing city like Ottawa, most district centres are likely to require an extension of the range of facilities they possess, rather than a decrease. The process for such an extension may be summarized as follows:-

1. Study the range of existing facilities, service and manufacturing activities in the district;

2. Carry out a survey in which respondents are asked to indicate the purposes and purchases for which they have to travel outside the district at present;

3. Carry out a survey of visitors to the existing district centre to determine the range of goods and services for which they find this centre attractive;

4. Determine the future specialization of the district and particularly its centre, in the light of 1, 2 and 3 above and on the basis of a policy in relation to surrounding districts and overall policy for the distribution of specialized activities in the city (Armen 1967; 1971);

5. Illustrate alternatives in the range of facilities for the district centre, differentiating between existing and projected elements - i.e., service and industrial activities, if any, and the facilities to accommodate them;

6. Hold public meetings to discuss the alternatives;

7. Plan the layout of the selected range of facilities, bearing in mind the linkages indicated in Diag. 19 and Table 20. Space occupied by any existing facilities likely to fall vacant, should be considered for the accommodation of the selected range;

8. Consider weather-exclusion by covering the whole or at least part of the complex formed by existing and new facilities.

The creation of a new district centre in a greenfields situation, as may exist around a projected Rapid Transit stop - e.g., Hurdman (Diag. 24) - may require only steps 4 to 8 in the above procedure.

NEIGHBOURHOOD CENTRES FOR LOCAL LIFESTYLES

At the local scale of distribution, residents should be involved in planning as closely as possible, because it is particularly at this scale that the correlation between people, place and activities has to be the highest (Diags. 16, 17). A fully participatory method will ensure better satisfaction of consumer needs and result in an urban or rural environment with identity (Armen 1971; 1972). On the basis of the method developed in the City of Ottawa to establish model by-law principles for solar access protection (ECTP Study on SOLAR ACCESS PROTECTION IN BUILT-UP AREAS, 1982-1984), the 'networking' process illustrated on Diag. 30 may be elaborated on as follows:-

1. Study the range of existing facilities serving the community and draw diagrams showing the spatial relationship of the ones forming the largest clusters in the area;

2. Organize a public meeting to discuss the issues of further provision and future linkage of facilities in the area. Conclude the meeting by calling for the election of a local advisory planning committee to study and resolve the issues with the help of local expertise and the municipal planning department;

3. The elected committee should initiate a survey of social provision needs - i.e., facilities relating to education, health, recreation, entertainment, culture and retail - and of current trips undertaken inside and outside the area for the satisfaction of these needs;

4. The analysis of survey data will indicate the types of facilities lacking in the community and the most popular cluster of existing facilities according to current multi-purpose trips. The committee may now invite local experts to form study teams and carry out detail studies with the help of the municipal planning department to establish:-

   a. The best ways of extending social provision to cover the areas and services in which the community is at present deprived;

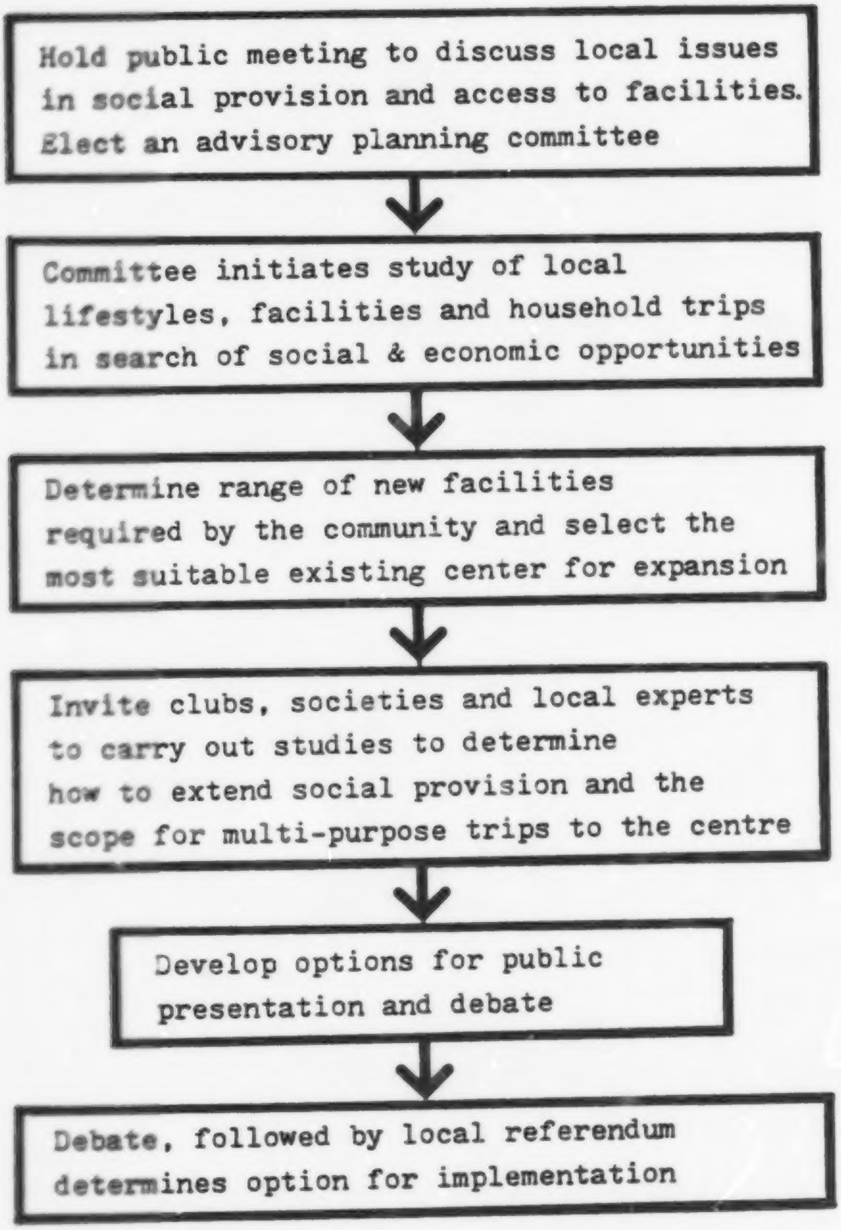
   b. Whether the most popular cluster of existing facilities lends itself to conversion, expansion and other ways of increasing the scope for multi-purpose trips in the community;

   c. Whether the municipality intends to establish any specialized facilities over and above the ones required by the local community, as part of its policy for the distribution of major facilities.

5. The recommendations produced by the study teams should be discussed and co-ordinated by the committee and any options or alternative solutions should be illustrated for public presentation and debate;

6. Public debate on the options may take two or three meetings and may culminate in a local referendum - by vote or televote - to select the

CITIZEN INVOLVEMENT IN PLANNING THE EXPANSION OF A COMMUNITY CENTRE TOWARDS GREATER CONVENIENCE & EFFICIENCY



Hold public meeting to discuss local issues in social provision and access to facilities. Elect an advisory planning committee

Committee initiates study of local lifestyles, facilities and household trips in search of social & economic opportunities

Determine range of new facilities required by the community and select the most suitable existing center for expansion

Invite clubs, societies and local experts to carry out studies to determine how to extend social provision and the scope for multi-purpose trips to the centre

Develop options for public presentation and debate

Debate, followed by local referendum determines option for implementation

Networking for Local Community Centre Expansion

most broadly acceptable option for the provision of new facilities and their clustering to extend the scope for multi-purpose trips;

7. Consideration should be given to the financial viability of weather-exclusion for the whole or part of the cluster(s) planned for the community, by the combination of existing and projected facilities. Other forms of linkage between proximate facilities may include the covered way, footpath or cyclepath between them.

The progression from advisory committee to study teams and community debate is intended to: firstly, increase public involvement in parallel with the growing scope of the studies to be undertaken, secondly, to spread the responsibility for decision-making to the entire community, and thirdly, to ensure that every resident has a stake in local plan revision. In accordance with the principle of networking, this 'fanning out' of work, responsibility and personal stake in the success of a plan is the most reliable way to ensure implementation. Because the wider the network of people involved in planning the local community, the higher the sense of involvement and personal stake in favour of implementation is likely to be. (Armen, 1982)

ESTABLISHING ENERGY-EFFICIENT PATTERNS BEYOND 1992

If the revision of a community or district centre is to comprise a planning period which extends beyond 1992, the energy-efficient patterns of land use, or clusters of facilities which encourage the use of multi-purpose trips shown in this study, may not be usable. In any case, urban planners may like to have a method for establishing socially convenient and energy-efficient patterns of land use at any point in time in the future. The simulation game shown in Appendix 3 - see APPENDICES volume - could be updated in terms of assumptions and energy scenarios, improved and computerized to be available like any other video game today, for the use of interested households. When a planning authority decides to conduct the equivalent of the Ottawa Energy Budgets Game 1982-1992, it could make a formal announcement similar to the one shown on the cover of this report and subsequently send a letter of request to the households selected as the formal sample for the Game. These households could opt to play either by themselves, using a standard video tape of the Game, or with the benefit of an interviewer's assistance. The results would be collated and analysed by the planning authority to arrive at the equivalent linkage diagrams for the selected study period, as shown on Diags. 10-20 in this report. All differences will be due to changes in technology, society, economics and lifestyles.

GA:baw-1
02D118

D. IMPACT ON URBAN PLANNING

Many studies into the prospects for the 1980's conclude that it will be a decade of unprecedented and rapid change and this study could be no exception. An extensive number of social, economic and technological changes have been forecast and several among them are likely to have an impact on urban planning - the growth of population, the uncertainty or scarcity of energy supplies, the decreasing size of households, the numerous inventions, the explosion of telecommunications, the change in occupational and industrial structure, etc. While the number of expected changes is vast, the rate at which they are likely to follow each other and increase the momentum of interactions between them may be even more far-reaching in its implications for urban planning.

As a response to this tremendous pressure for change, planners will have to reconsider current precepts, practices and procedures to meet the following challenges:-

1. Develop anticipatory methods of survey and planning to allow timely response to expected and unexpected changes. The simulation game under carefully worked out assumptions and explicit objectives is a promising technique, but scenario writing, the Delphi symposium and many others also merit experimentation and development for setting urban planning objectives in an era of rapid change.

2. Replace land use zoning with more flexible, mixed-use alternatives based on current, broadly acceptable criteria like social convenience and energy efficiency;

3. Develop community involvement techniques which rely on group interaction and co-operation processes and make full use of telecommunications - e.g., televoting. This should bring planning into every household.

4. Politicize planning. The task of siding with the disadvantaged in society and seeking to maintain and perhaps even improve vulnerable lifestyles in the prospect of an energy-starved future should be emphasized in planning. Conflict is endemic in urban develoment or renovation and the political nature of planning will increasingly become more evident to the citizen. The profession should not shirk from the responsibility of making the planning process subject to political debate and extending the decision-making circle to embrace society as a whole.

5. Facilitate access to planning information in order to foster public debate on urban and environmental issues. Citizens should be able to obtain sufficient data on an issue, from the comfort of their home and through the use of a computer terminal, in order to be usefully involved in the planning process and in public debate on urban and environmental issues.

6. Develop planning techniques for pluralism

As Diags 16 and 17 illustrate, the acceptance of different lifestyles is the first step towards the preparation of community plans to serve each one of them, as indicated in C above. Beyond the need for "different plans to serve different clans" however, planners will have to respond to the need for different approaches, precepts and processes of planning for successful plan preparation and implementation with each lifestyle group.

In response to all these challenges, it is submitted that planning will have to become more akin to a social, than a technical problem-solving process; data collection will mean more social survey and networking with citizens, than isolated research behind Census volumes; data analysis will involve more thematic mapping by computer, than abstract painting with 'magic marker'; and the selection of a final option among alternative plans for a community will certainly call for more teleconferencing and televoting, than fiddling with option evaluation matrices.

All these imply a fundamental change in attitude and education for the profession. Because in this decade of challenge, urban planners are likely to become more akin to social leaders, than to environmental scientists.

GA:agb-2

D2D119

Number/
Numéro

3

ONTARIO MINISTRY OF MUNICIPAL AFFAIRS AND HOUSING
ONTARIO MINISTRY OF ENERGY
CITY OF OTTAWA

ENERGY USE
AND LAND-USE PATTERNS
IN THE CITY

ECTP Study Programme
Final Report

SUMMARY

Ottawa

October 1983

ECTP STUDY PROGRAM FINAL REPORT SUMMARY

ENERGY USE & LAND USE PATTERNS IN THE CITY

City of Ottawa
Ville d'Ottawa

conservation pipeline

Knowing how our lifestyles may change will help City Council plan for a more convenient city.

Brief were the days of the oil glut bonanza at the gas pump . . . long-term gasoline price projections of the Ontario Ministry of Energy, indicate 240% to 260% increases over current prices by the year 1992.

How will your lifestyle fare with such gasoline price hikes?

To help you visualize the lifestyle change that you may have to introduce to your household to cope with this situation, the Energy Planning Section at City Hall will send you:

The Ottawa Energy Budget Game

in which the players try to recapture all the activities in their lifestyle DESPITE reductions in car mileage reflecting foreseeable gasoline price hikes. By the year 1988 you may not only have converted your car to run by propane, you may even have to buy an electric or a hydrogen car.

If you live in Billings, Dalhousie or Capital Ward, your household may be among those selected to take part in this very enjoyable survey. First you will record your trips to various facilities over the past year on a Survey Form. Then you will play the Ottawa Energy Budget Game of combining visits to convenient facilities in ROUND-TRIP fashion. The combinations you suggest will help to plan the location of new facilities in the City, so as to increase social convenience and energy conservation in our environment.

YOUR OPINION MATTERS

Tell us how to enrich Ottawa's lifestyle Even through the Energy Tight 1980's

City Council would greatly appreciate your response to this survey. Interested households beyond the selected Wards may also obtain their FREE copy of the Ottawa Energy Budget Game by calling

The City Energy Planner
(Gary Armen) at 563-3000

A token of appreciation from the Mayor will be sent for every response.

Help to make Ottawa the Energy-Efficient Capital

ACKNOWLEDGEMENTS

The Survey of Energy Use and Household Trips in 1982, to establish a benchmark for the study of lifestyles in relation to energy in the City of Ottawa, involved the voluntary response to a lengthy questionnaire by no fewer than 753 households. Dozens of junior school students carried out the distribution and collection of these questionnaires and scores of teachers saw that both these tasks were properly and punctually carried out to solicit maximum response.

The Ottawa Energy Budgets Game to establish possible changes in patterns of energy use and household trip by 1992, necessitated a symposium of 12 specialists to make projections in public and private development in the Ottawa region to that year (See 'SYMPOSIUM' volume*) and subsequently involved the employment of 20 university students and the participation of over 300 households. Many of these households played and recorded their moves in the Energy Budget Game, by themselves, without waiting for help from interviewing students, thus demonstrating a remarkable patience and sense of responsibility for the future of the urban environment in Ottawa.

A debt of gratitude is due to all these households, teachers, specialists and students. It is hoped that their expectations from citizen participation in planning the location of urban facilities, in layouts which minimize car travel, will in due course, be fully realized.

---

*NOTE: The full report on this Study consists of the following volumes:

1. Summary
2. Final Report
3. Symposium
4. Appendices

TERMS OF REFERENCE

The goals and objectives of this project, in accordance with the City's application for an Energy Conservation Through Land-Use Planning grant to the Ontario Ministries of Energy and of Municipal Affairs and Housing may be stated as follows:-

GOAL:

Identify the difference between existing and energy-efficient patterns of land-use, to provide guidance for Official Plan amendment from the scale of the local community to that of the City as a whole.

OBJECTIVES:

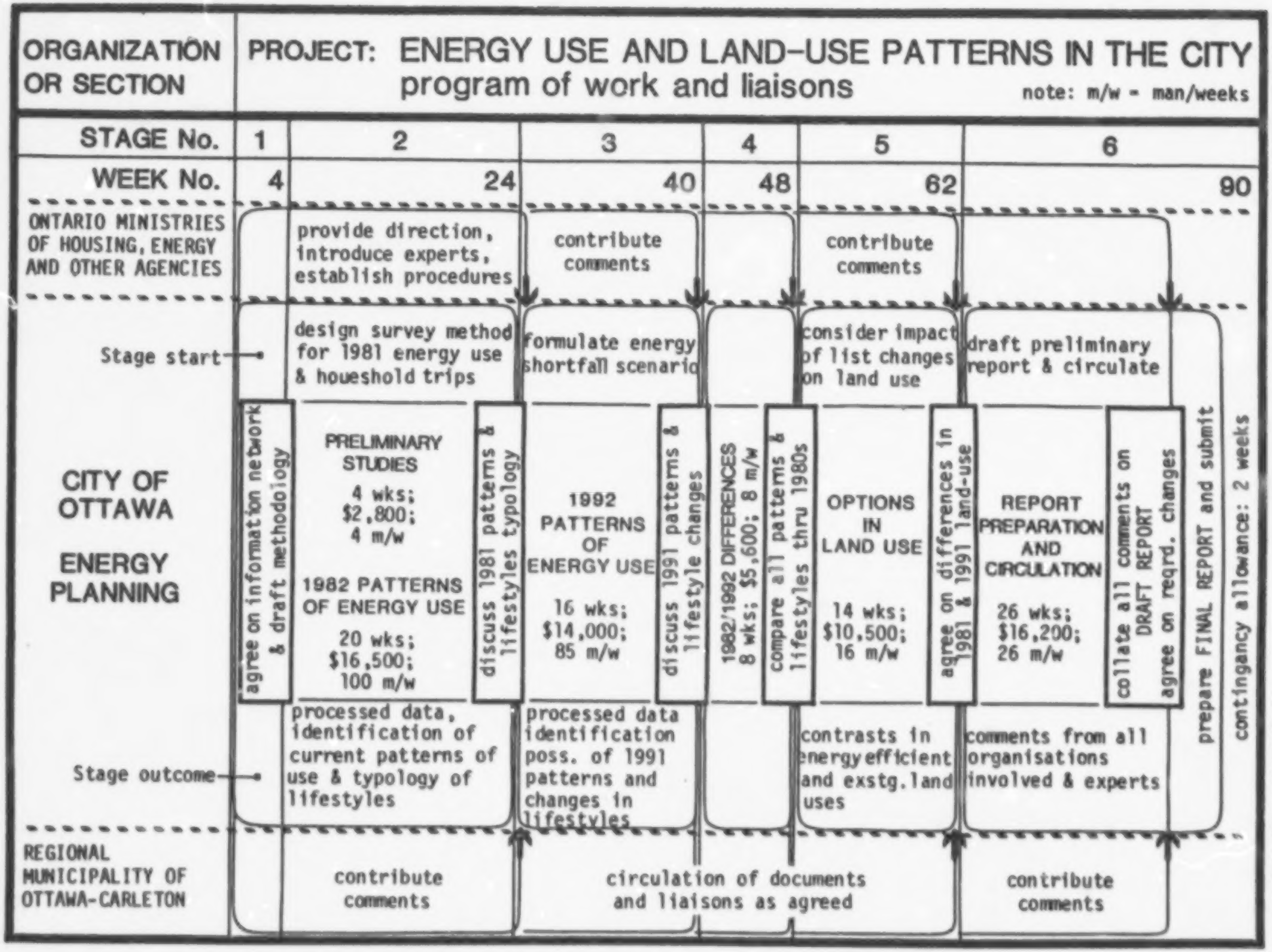
i. To establish current (1982) and possible 1992 patterns of energy use and household trip to social and economic opportunity;

ii. To formulate more energy-efficient patterns of land use in the City, in order to serve possible 1992 lifestyles;

iii. To identify differences between existing and energy-efficient land-use patterns.

PROGRAMME

The research was carried out over a period of twenty-one (21) months from February 1982, to October 1983, inclusive in accordance with Flow Chart 1.



FLOW CHART 1

PROJECT: ENERGY USE AND LAND-USE PATTERNS IN THE CITY
program of work and liaisons

note: m/w - man/weeks

ORGANIZATION OR SECTION						
STAGE No.	1	2	3	4	5	6
WEEK No.	4	24	40	48	62	90
ONTARIO MINISTRIES OF HOUSING, ENERGY AND OTHER AGENCIES		provide direction, introduce experts, establish procedures	contribute comments		contribute comments	
Stage start		design survey method for 1981 energy use & houeshold trips	formulate energy shortfall scenario		consider impact of list changes on land use	draft preliminary report & circulate
CITY OF OTTAWA ENERGY PLANNING	agree on information network & draft methodology	PRELIMINARY STUDIES 4 wks; $2,800; 4 m/w 1982 PATTERNS OF ENERGY USE 20 wks; $16,500; 100 m/w discuss 1981 patterns & lifestyles typology	1992 PATTERNS OF ENERGY USE 16 wks; $14,000; 85 m/w discuss 1991 patterns & lifestyle changes	1982/1992 DIFFERENCES 8 wks; $5,600; 8 m/w compare all patterns & lifestyles thru 1980s	OPTIONS IN LAND USE 14 wks; $10,500; 16 m/w agree on differences in 1981 & 1991 land-use	REPORT PREPARATION AND CIRCULATION 26 wks; $16,200; 26 m/w collate all comments on DRAFT REPORT agree on reqrd. changes prepare FINAL REPORT and submit contingency allowance: 2 weeks
Stage outcome		processed data, identification of current patterns of use & typology of lifestyles	processed data identification poss. of 1991 patterns and changes in lifestyles		contrasts in energy efficient and exstg. land uses	comments from all organisations involved & experts
REGIONAL MUNICIPALITY OF OTTAWA-CARLETON		contribute comments	circulation of documents and liaisons as agreed			contribute comments

ENERGY USE AND LAND-USE PATTERNS IN THE CITY

Summary

OBJECTIVE

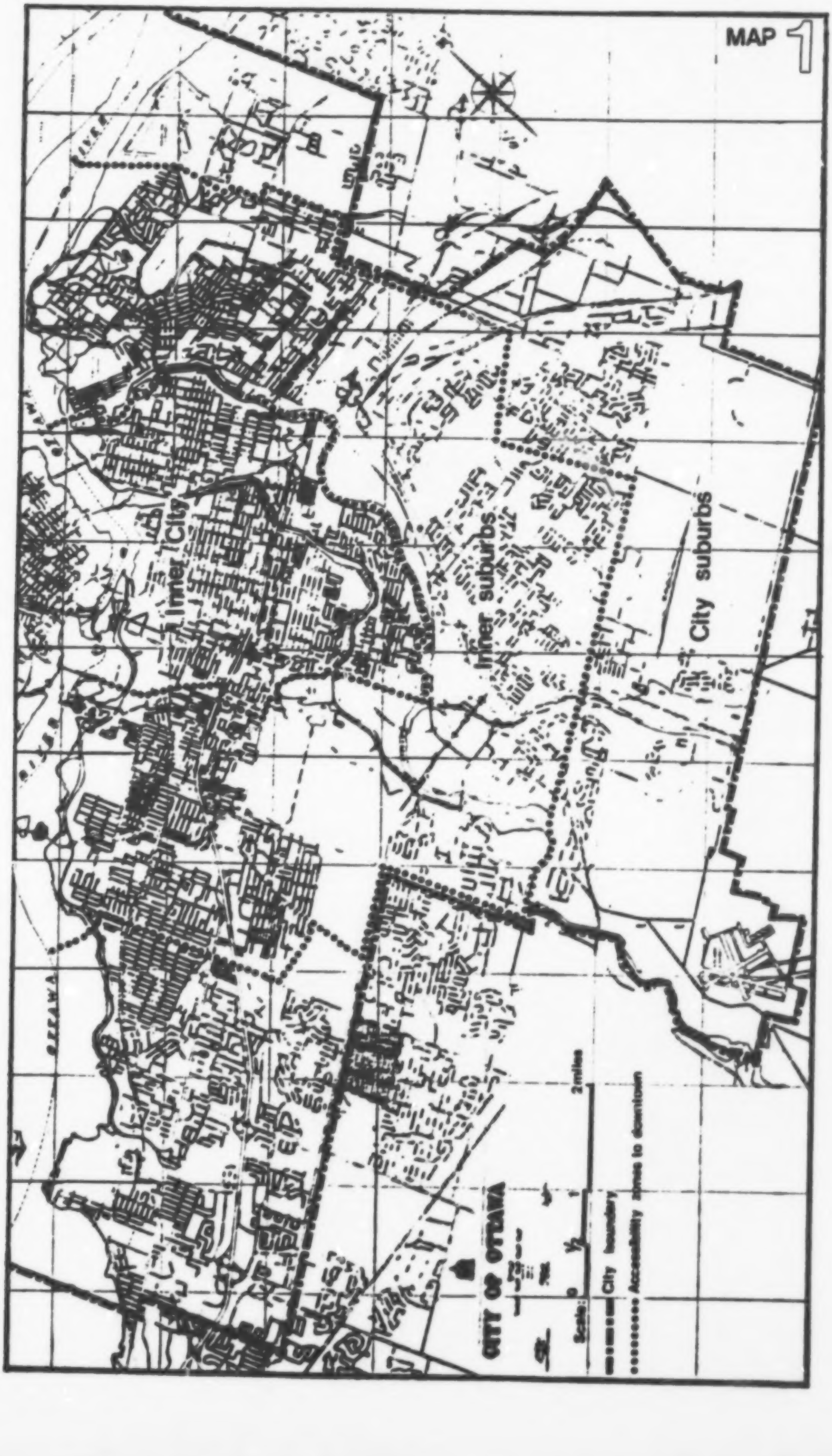
The principal objective of this study was to consider the availability of energy over the decade 1982-1992 and its probable impact on lifestyles in the City of Ottawa, in order to formulate energy efficient patterns of land use. These patterns would provide guidance for Official Plan preparation.

METHODOLOGY

The methodology is based on a lifestyles approach to planning, which aims to establish current and foreseeable patterns of energy use and household trip to various facilities in a city and subsequently re-arrange land uses in clusters suggested by statistically significant numbers of people, representing all walks of life in that city. These clusters should extend the scope for multi-purpose trips by a household, in order to minimize car travel.

Current (1982) patterns of energy use and household trip in Ottawa were established by questionnaire, delivered to some 2,000 households in 100 city blocks, evenly distributed over 3 accessibility zones to downtown (Map 1). More than 750 households responded (37.6%) in English or French and a check against a control sample and for even geographical distribution resulted in the

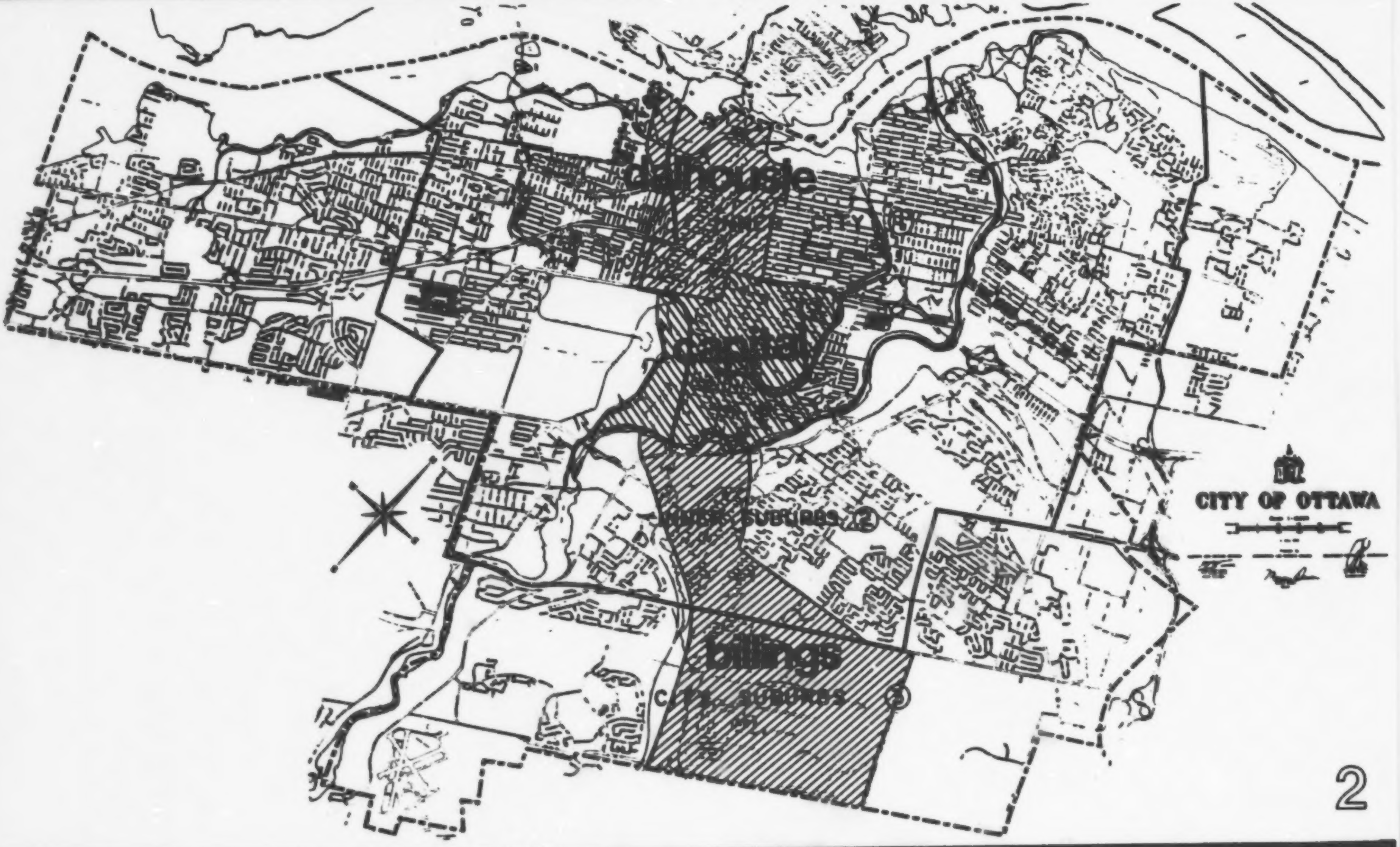
MAP 1


Inner City
Inner suburbs
City suburbs
OTTAWA
CITY OF OTTAWA
Scale: 0 ½ 1 2 miles
City boundary
Accessibility zones to downtown

admission of 604 good quality responses for analysis. The standard error for this sample was ±1.44%.

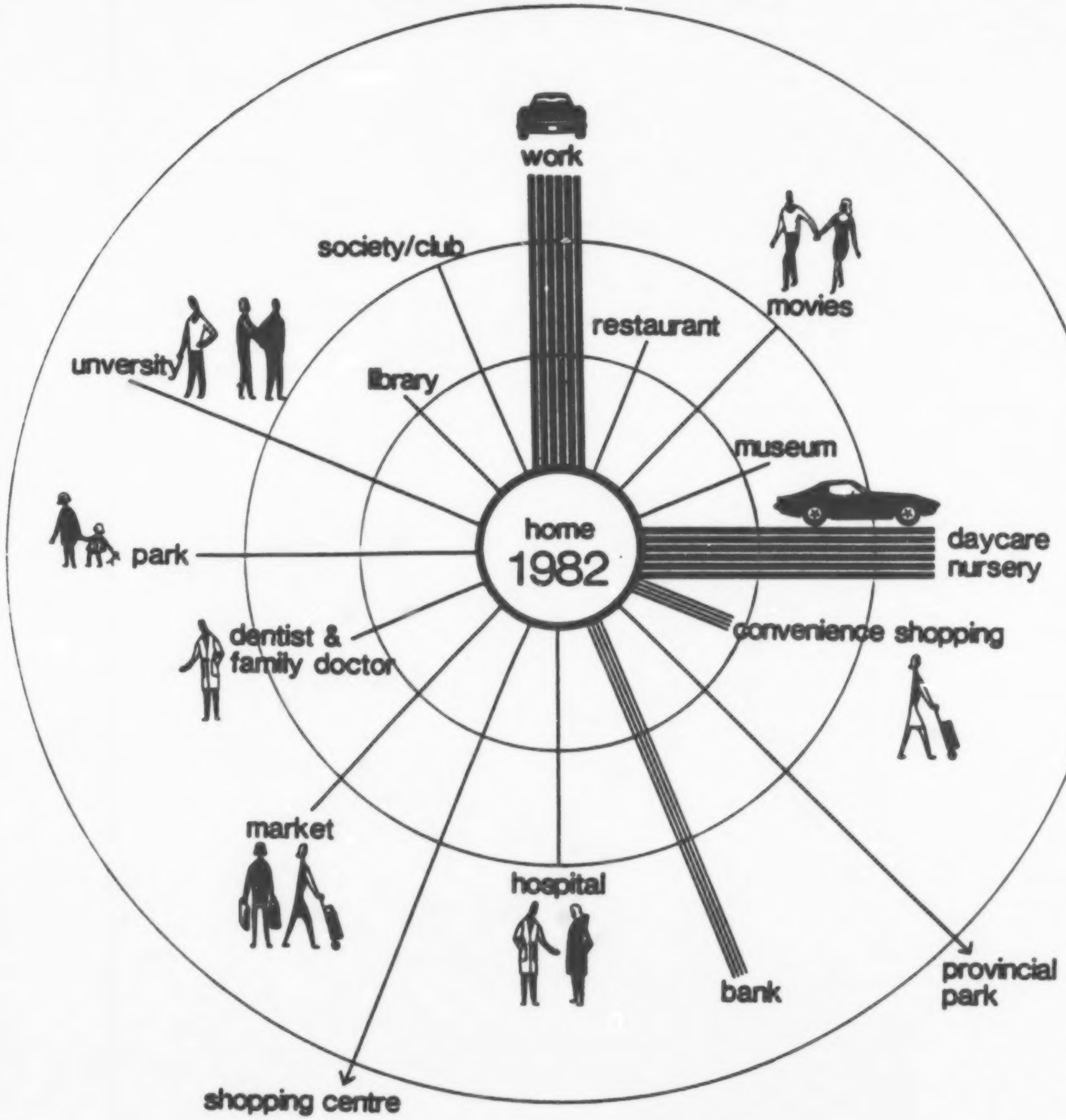
Foreseeable (1992) patterns of energy use and household trip were established by questionnaire survey followed by a simulation game supervised by an interviewer, to record the household's choices in response to three scenaria covering the periods 1982-1985; 1986-1988; and 1989-1992. These scenaria were formulated through a symposium of 12 specialists from government and private industry in the Ottawa region, each making projections in his field and reacting to others in the group.

During the simulation game, each scenario required a participating household to make choices between various alternatives - in travel mode, frequency of activity, multi-purpose trip, forthcoming inventions and other means to help reduce the consumption of energy, in relation to their 1982 budget of miles and disposable income. The sample of 500 randomly selected households in three wards of the city extending from downtown to the suburbs (Map 2) was supplemented with voluntary responses solicited by the announcement shown on the cover of this volume. More than 340 survey forms, completed in English or French were collected (68.2% response) and following a check against the City's household structure, a total of 306 good quality responses were admitted for analysis. The standard error for this sample was ±0.69.


dalhousie
CITY ①
capital
SUBURBS ②
billings
SUBURBS ③
CITY OF OTTAWA

2

Conserver Lifestyle


work
society/club
restaurant
movies
unversity
library
museum
home
1982
park
daycare
nursery
dentist &
family doctor
convenience shopping
market
hospital
bank
provincial
park
shopping centre

Annual Car Kmileage 7,240

Current Multipurpose Trips

`work-grocery-work`

`home-daycare-bank-daycare-home`

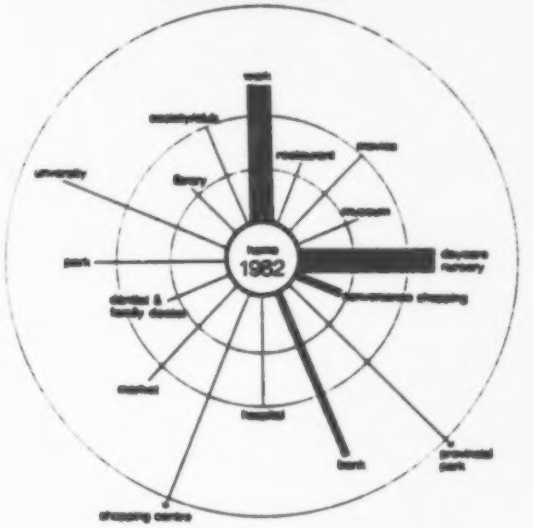
Pairs of Facilities Convenient to Use: 26

1982 Expenditure on:

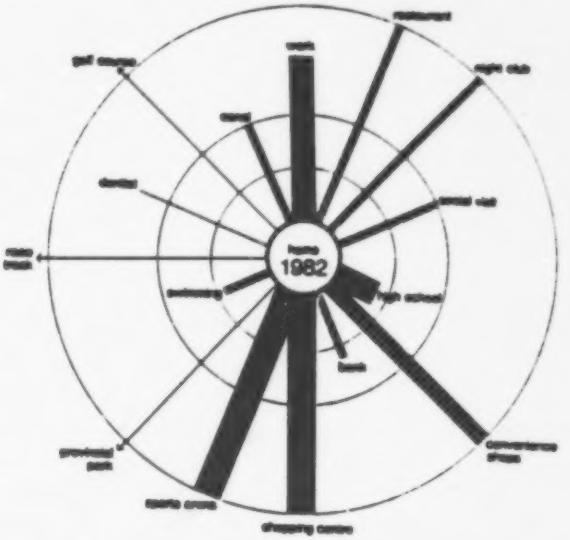
gasoline:	$1,120
bus:	$60
bicycle:	$6

1982 PATTERN OF HOUSEHOLD TRIPS

Conserver Lifestyle


work
society/club
restaurant
movies
university
library
museum
park
home
1982
daycare
nursery
convenience shopping
dentist &
family doctor
market
hospital
bank
provincial
park
shopping centre

Frivolous Lifestyle


restaurant
golf course
work
night club
canal
dentist
social visit
race
track
home
1982
swimming
high school
bank
provincial
park
convenience
shops
sports arena
shopping centre

Annual Car Kmileage 7,240

Current Multipurpose Trips

work-grocery-work

home-daycare-bank-daycare-home

Pairs of Facilities Convenient to Use: 26

1982 Expenditure on: gasoline: $1,120
bus: 500
bicycle: 56

Annual Car Kmileage 42,929

Current Multipurpose Trips

home-restaurant-gas station-home

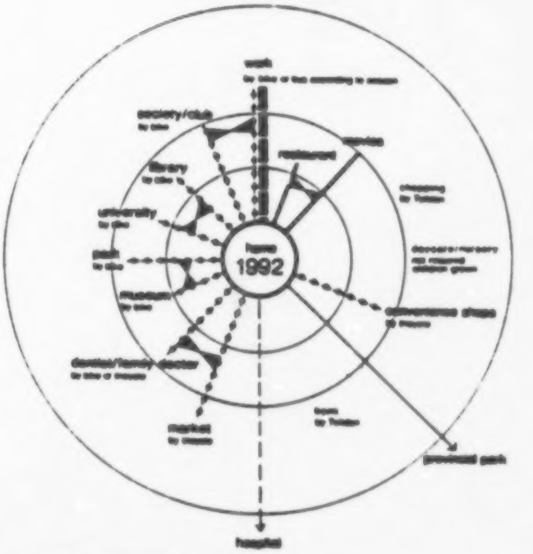
home-mechanical repairs-video store-home

Pairs of Facilities Convenient to Use: 9

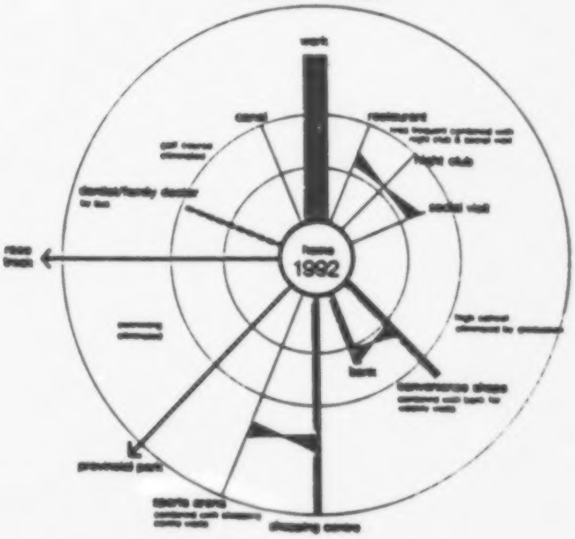
1982 Expenditure on: gasoline: $3,420
bus: nil
bicycle: nil

SIMULATED 1992 PATTERN OF HOUSEHOLD TRIPS

Conserver Lifestyle


work
society/club
by bike
movies
restaurant
library
by bike
university
by bike
park
by bike
museum
by bike
home
1992
convenience shops
dentist/family doctor
market
provincial park
hospital

Frivolous Lifestyle


work
canal
restaurant
golf course
night club
dentist/family doctor
social visit
race
track
home
1992
high school
bank
convenience shops
provincial park
sports arena
shopping centre

Annual Car Kmileage 340

Planned Multipurpose Trips

home-university-library-home

home-work-social club-home

home-restaurant-movies-home

home-dentist/family doctor-market-home

home-museum-play park-home

Inventions Purchased

tricycle
Telidon
conversion to hydrogen (car)
(home caulked and weatherized in period 1983-85)

Annual Car Kmileage 4,970

Planned Multipurpose Trips

home-sports arena-shopping centre-home

home-bank-grocery store-home

home-social visit-restaurant-night club-home

Inventions Purchased

none

RESULTS

A Typology of Lifestyles

Principal Components and Factor Analysis of the data collected from the first survey, identified certain destinations, energy use and socio-economic characteristics of households, as underlying the distinction between energy frivolous and conserver lifestyles in Ottawa (Diag 3).

The former had a distant cottage, lived far from the husband's workplace and from shopping centres, restaurants, movies and other frequently visited facilities. They also had many members in the household, spent a lot on gasoline and heating oil and their prosperity depended on the occupation, education and age of the principal member of the household. Their lifestyle was most vulnerable, however, because the income per household member was not high.

Conserver households on the other hand, visited facilities in 'round trips', used natural gas, electricity or solar heating, had two highly educated principal members to head the household and spent a lot on public transport. These diametrically opposed attitudes in the use of energy, together with household size and residential location were adopted as a basis for the classification of all Ottawa lifestyles into 36 relevant types, for purposes of further analysis and projection of change to 1992.

TABLE 1 : RANKING OF THE MOST POPULAR DESTINATIONS BY ANNUAL CAR KMILEAGE OF TRAVEL CAUSED TO SURVEY RESPONDENTS IN 1982

DESTINATIONS RANKED BY VALUE OF: (A X B X C X D)	NO. OF VISITORS IN 1982 (A)	% BY CAR (B)	ANNUAL TOTAL OF VISITS* (C)	AVE. NO. OF KMS TRAVEL'D (D)	TOTAL KMILEAGE TRAVELLED BY ALL RESPONDENTS (A X B X C X D)
Husband's Workplace	318	57.5	280	14.1	721,892
Shopping Centre	458	80.3	262	7.2	693,769
Restaurant	390	79.5	94	12.1	352,651
Cottage	141	97.2	38	64.5	335,914
Social Visit (1)	429	80.4	254	3.3	289,108
Wife's Workplace	206	50.5	280	9.2	267,981
Social Visit (2)	242	72.3	42	29.2	214,578
Movies	288	74.3	73	10.2	159,332
SUB-TOTAL for 8 destinations (6 types of activities)					3,035,225
Convenience Shops	372	43.5	271	3.6	157,872
Family Doctor	412	68.7	43	10.2	124,143
Bank	437	52.4	82	5.1	95,763
Swimming Pool	159	45.3	186	7.1	95,119
Church	250	71.2	52	7.8	72,197
Pharmacy	282	55.7	51	8.1	64,887
Library	249	47.0	52	7.7	46,859
Park/Play Area	219	21.9	204	3.6	35,222
Dental Facility	344	65.1	18	8.3	33,457
Theatre	205	71.7	24	9.1	32,101
Museum	176	62.5	15	12.3	20,295
Hospital	196	77.0	12	9.9	17,929
Concert	143	68.5	10	9.2	9,012
TOTAL for 21 destinations (18 types of activities)					3,840,081

$$\frac{\text{Sub-total for 6 types of activity}}{\text{Total for 18 types}} = 79.04\%$$

NOTE: *Annual total of visits has been rounded to the nearest whole number.

GA:mm-4
D2D037

Key Urban Activities

The calibration of results from the first survey by the use of Principal Components and Factor Analysis helped to distinguish between the important and less important elements in energy conservation. This could be used to priorize municipal actions - particularly in community outreach - in order to concentrate effort and expenditure on the most effective measures. For example, the ranking of 21 most popular destinations in Ottawa lifestyles by annual mileage of car travel caused to survey respondents, indicated that six activities - commuting to work, shopping, going to restaurants, to the cottage, social visiting and movie going, caused nearly 80% of the total travel to these 21 destinations (Table 1). One conclusion might be that car pooling to work and van pooling to shopping centres might be worth promoting in times of severe gasoline scarcity. Similarly, land use planning could be focused on key activities to help reduce travel with maximum effect, before dealing with secondary activities.

Key Factors in Energy Planning

By the same token, there is a set of key factors revealed by this study, which if considered in priority order during Official Plan preparation, could produce a balanced and constructive input to the urban planning process. This set of key factors would be as follows:

1. Energy availability for the foreseeable future;
2. Foreseeable patterns of energy use;

3. Foreseeable travel patterns;
4. Foreseeable lifestyle changes;
5. Land-use patterns to serve lifestyles.

Each of these may generate a hypothesis and the consideration of alternatives in all five, may lead to the formulation of scenarios for the foreseeable future. The analysis of travel patterns to various facilities for example - by mode of transport, frequency of visits, demand cone, common hours of operation of facilities and other correlations - led to the formulation of a hypothesis, which paired facilities similar in all the above-mentioned aspects, as a first step towards the formulation of clusters of mixed land use, to extend the scope for multi-purpose trips in the City.

Energy Availability: 1982-1992

The current stable prices for oil appear to be only temporary and by the end of the decade, all energy resources could be expected to become increasingly expensive. This will mean high maintenance costs for buildings, high rental levels and property values and greater emphasis on renovation than new construction in outward ripples from the Inner-City. The continual rehabilitation of existing public and private house stock will call for the development of a labour-intensive, science-based and computer-oriented renovation technology with growing reliance on renewable energies and passive solar design in particular.

Foreseeable Patterns of Energy Use: 1982-1992

In view of the growing shortage of energy during the study decade, there will be a continual diversification from fossil fuels in favour of renewable, dependable and local energies. Passive and active solar will progressively lead to affordable photovoltaics and the abundant generation of low-intensity electricity and hydrogen. These and other highly flexible forms of renewable energy will be used for a great variety of purposes from cooking, through heating, to transportation. Even manpower will be relied upon in this diversification effort, but the greatest contribution may be expected from the computer. Telecommuting for example - working at home by reliance on two-way computer terminal - could drastically reduce energy needs in the future.

Foreseeable Travel Patterns: 1982-1992

The challenge of overcoming the mounting price of gasoline after 1985 was met in a variety of ways by the respondents. The private car - whether converted to run by propane, electricity or hydrogen - continued to be a popular means of transport for selective trips, which by virtue of distance, weather or time, could not be substituted by some other mode. Many believers in the conserver ethic, proved particularly resilient however, opting to diversify and rationalize the modes used on every occasion, by resorting to multi-purpose trips, bicycle or tricycle, transit bus, telecommunication, or even skating to reduce the impact of gasoline price hikes. On the other hand, no respondent would sell his cottage - one of the most demanding facilities in car travel - no matter how expensive energy were to become, preferring instead to reduce the frequency of visits. The receptiveness to new inventions offering scope for energy conservation or trip elimination was an important difference between well-educated 'conserver' respondents and others. Their multi-purpose trips were also better planned, longer and more varied in number and scope.

The most frequently employed substitutes to the car for the journey-to-work were rapid transit, the car-pool and the bicycle - in favourable weather. Telecommuting offered the scope of a virtual elimination of this journey and 44% of the respondents indicated willingness to adopt it, while a further 23% would leave the decision to their employer. Peak-hour traffic may therefore be substantially reduced with telecommuting, but its adoption depends on many other factors. As far as travel patterns are concerned, the need for energy-efficient patterns of land use will always be pressing, because it will help to minimize destinations in the city. Evening and night peaks may become more serious, as they gather momentum, to cater for increased entertainment and cultural outings. Teleshopping - the use of videotext for the selection of goods for home delivery - was very popular among respondents for the purchase of non-durable goods from district warehouse stores. Quality and convenience goods were thus the only purchases left for shopping expeditions and the former were expected to be found at regional centres, while the latter should be available at walking or at least cycling distance. Weekend traffic patterns are likely to continue with the dominance of day trips, picnic outings and cottage visits.

Foreseeable Lifestyle Changes: 1982-1992

A comparison of socio-economic characteristics and of the choices made by households during the simulation game helped to establish possible trends in lifestyle change between 1982 and 1992 and its implications for energy consumption and travel behaviour to social and economic opportunities.

A continual, though diminishing trend over the study period was the decrease in household size and the changing occupational structure of a declining work force. Several large homes in the survey were found to accommodate two or more households of widely varying lifestyles - e.g., aging parents + the young family of a sibling + bachelors in rented accommodation. An important difference between the lifestyles discerned in 1982 and 1992 was the increase of 'conservers' from 55% to 72% and the development of 'resilient conservers' as a growing sub-group among them. The additional criteria on which the 11% of 'resilient conservers' were discerned were:

a. Receptiveness to energy-related inventions;

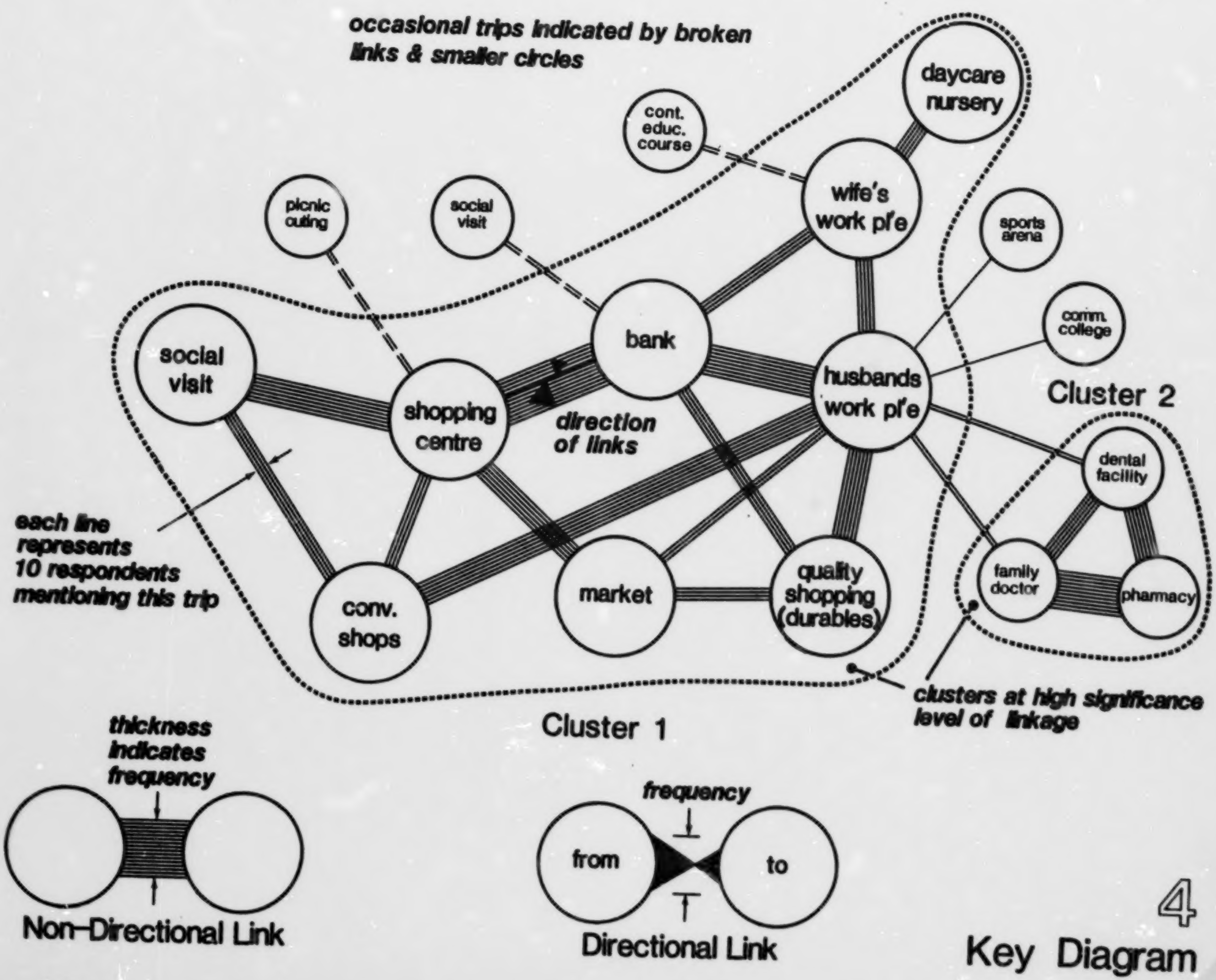
b. Choice of transport mode being related to energy, rather than income or prestige considerations;

c. Multi-purpose trips involving longer chains of activities, as indicated on Diagram 3;

d. Perseverence in trying to stay within the annual mileage limit for a period of the simulation game.

e. Ability to benefit from financial incentives for home renovation.

It must be emphasized that this increase in 'conservers' could be expected only if energy prices were to rise faster than disposable incomes and other circumstances assumed in the simulation were to prevail.


occasional trips indicated by broken links & smaller circles
daycare nursery
cont. educ. course
picnic outing
social visit
wife's work pl'e
sports arena
comm. college
social visit
bank
husbands work pl'e
shopping centre
direction of links
Cluster 2
dental facility
each line represents 10 respondents mentioning this trip
family doctor
pharmacy
conv. shops
market
quality shopping (durables)
clusters at high significance level of linkage
Cluster 1
thickness indicates frequency
frequency
from
to
Non-Directional Link
Directional Link

4

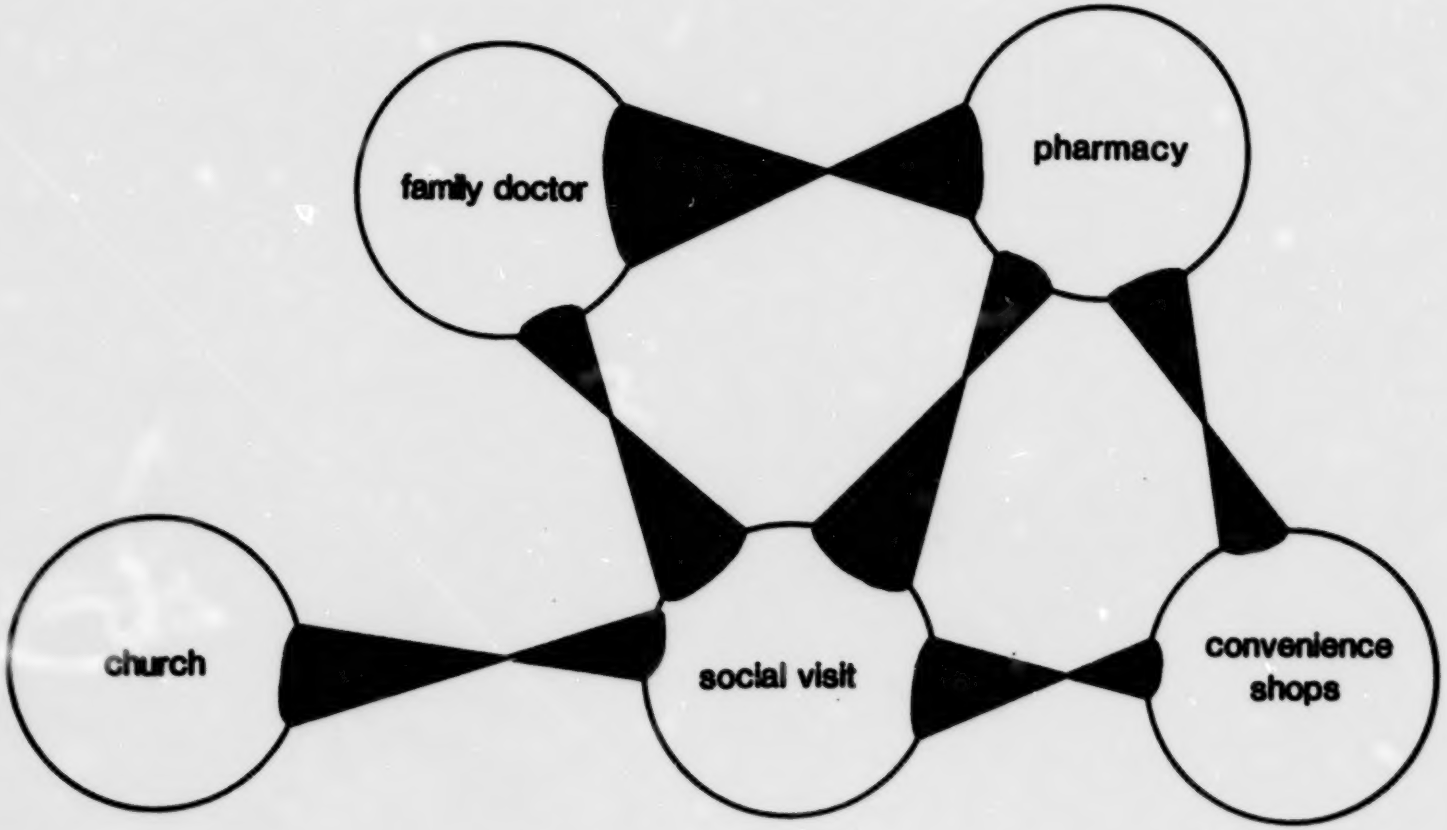
Key Diagram

TELIDON was the most popular among the foreseeable inventions included in the simulation game and it was followed by the Solar Collector and the Electric Car. Home Medical Care by TV, Hydrogen conversion of cars and the Tricycle followed closely, helping respondents of various lifestyle groups - 'resilient conservers' in particular - to save energy, preserve a healthy variety of activities and their standard of living. In this connection, some 'frivolous' groups proved most vulnerable, because they were least receptive to innovation and they found themselves increasingly restricted to television at home. As regards period in which some forthcoming inventions were 'purchased' during the simulation game, the tricycle, home medical care and pay TV were popular in 1983-85; TELIDON, hydrogen conversion, home medical care and solar collectors in 1986-88; and the electric car, TELIDON, solar collectors with photovoltaic cells, hydrogen conversion and mechanical robots in 1989-92. The need to 'purchase' inventions to satisfy traditional needs like shopping, meeting, learning, information, entertainment and culture was most frequently expressed by the educated and upper income respondents. The chance to improve one's skills and education by reliance on a videotext terminal at home was welcome to the majority of the respondents.

The most significant trend over the study decade could be the localization of employment at home, through the growth of home occupations and the acquisition of novel means of telecommunication to avail oneself of the expected growth in services and informatics. The longer time spent at home, meant taking better care of it, renovating, re-decorating, retrofitting, extending and generally improving it as a workplace, as well as for social visiting and purely residential purposes. As a reaction to the isolation felt by spending more time at home, it appears that leisure time will increasingly tend to be devoted to face-to-face contact, physical recreation, entertainment, festivals, spectacles, cultural activity and quality shopping. Although most of these will be possible to enjoy through TV or video, it will be the sense of occasion and the need for change, exercise and fresh air that will motivate most outings. Social visiting will be only partly replaced by videophone or long distance calls to distant friends or relations, for example. Close friendships, according to this survey, will always require and thrive on face-to-face meetings.

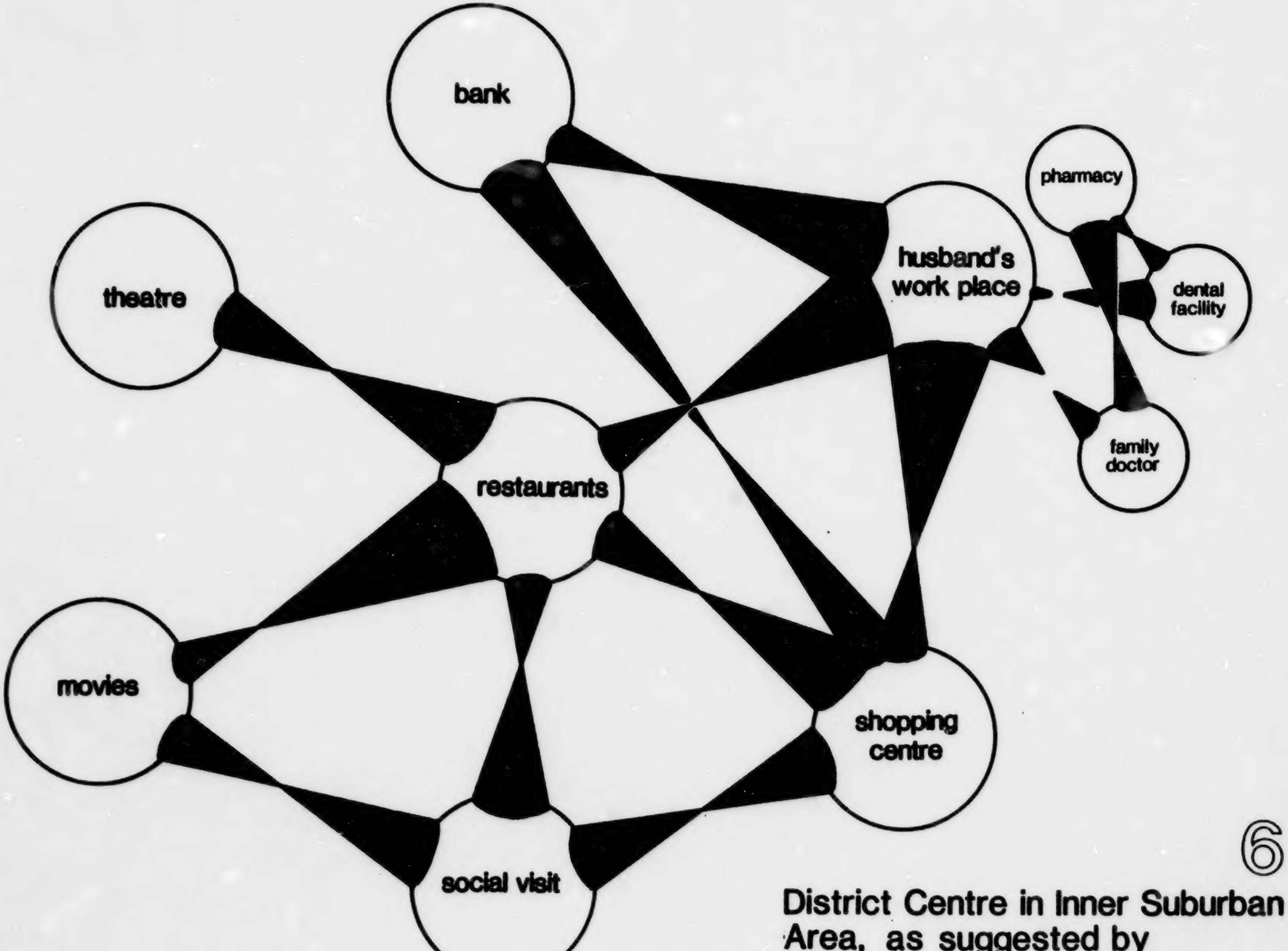
Foreseeable Land-Use Changes: 1982-1992

The interpretation of lifestyle changes into land-use patterns was based partly on consideration of the above-mentioned trends, but also on the interrelationship of activities indicated by respondents at three levels of supposition: (i) Multi-purpose 'round trips' to various facilities, as currently carried out, to save energy, time and money; (ii) Pairs of activities which would be convenient to carry out one after the other; and (iii) Proposed 'round trips' as a way of saving energy, in the course of the simulation game itself. Frequency counts of these three indications for the entire sample, as well as for specific lifestyle groups, resulted in the formulation of various clusters, as shown on Diags 4-7. These clusters suggest three levels of distribution of facilities: -


family doctor
pharmacy
church
social visit
convenience shops

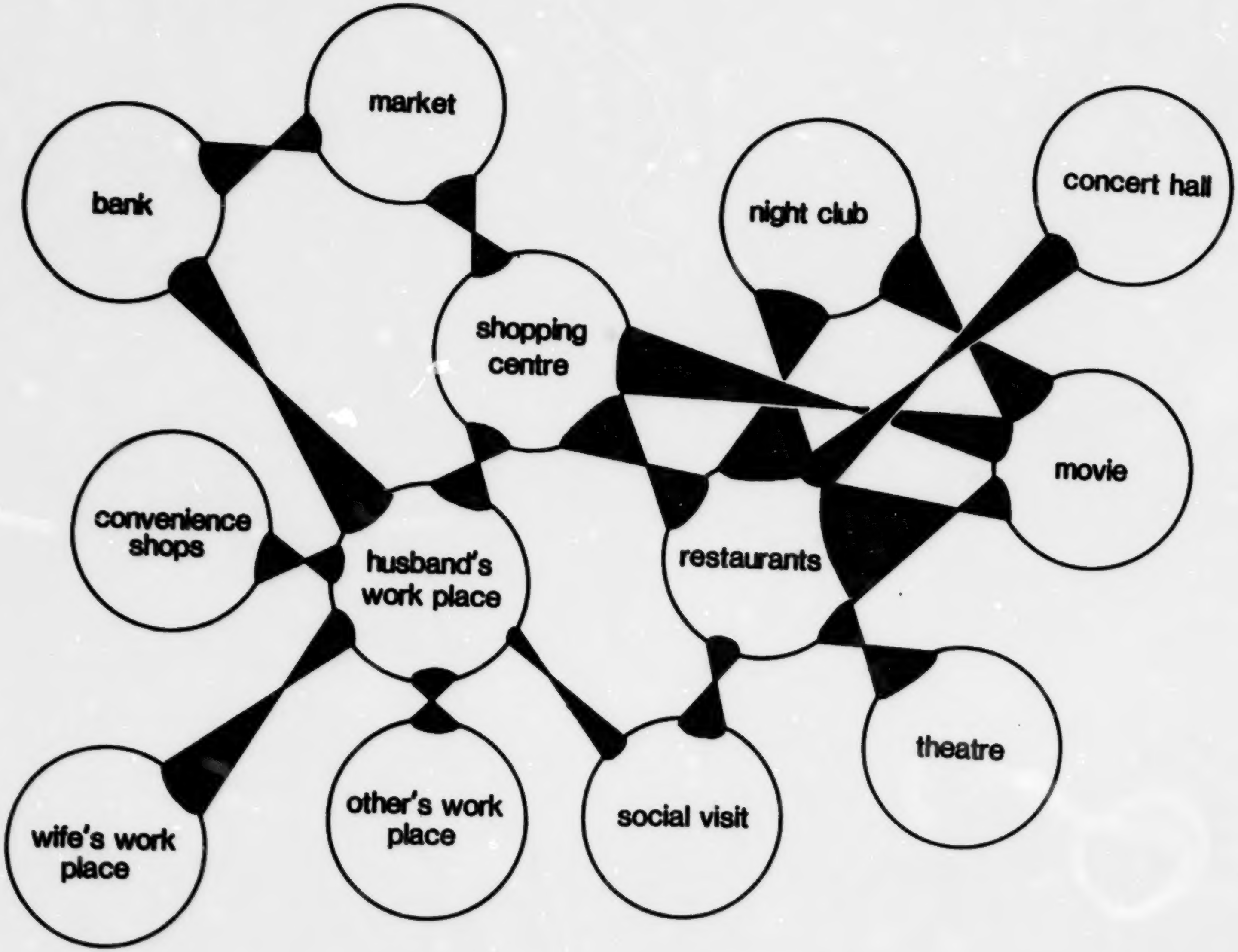
5

Simulated Multi-purpose Trips in an Inner Suburb Neighbourhood


bank
theatre
husband's work place
pharmacy
dental facility
family doctor
restaurants
movies
shopping centre
social visit

6

District Centre in Inner Suburban Area, as suggested by Simulated Multi-purpose Trips


market
bank
concert hall
night club
shopping centre
movie
convenience shops
husband's work place
restaurants
theatre
wife's work place
other's work place
social visit

7

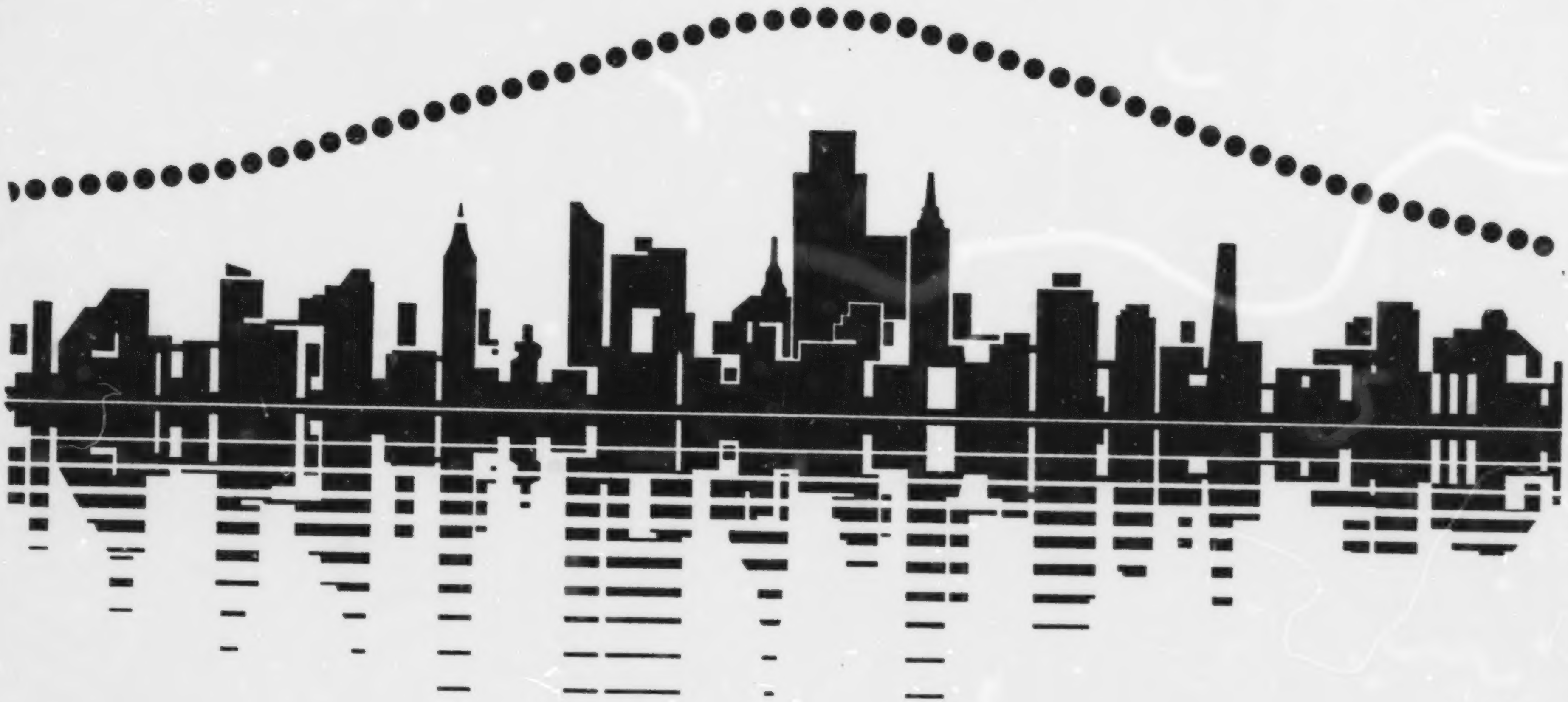
Downtown Complex Suggested by
Simulated Multi–purpose Trips

a. Locally accessible clusters or isolated facilities within walking or cycling distance, serving people of a particular lifestyle, resident in the immediate vicinity (Diag 5);

b. Community and district centres of a variable size and composition, serving a population between 15,000 and 60,000 according to content of specialized facilities and geographical location on the transport network, to serve a community with particular socio-economic characteristics in the inner or outer suburbs of the City, as well as people attracted from other communities (Diag 6);

c. A large downtown complex of facilities serving the inner city for basic service needs and the entire city and region for specialized needs (Diag 7). Indirectly, this centre would also disseminate innovations and generate continual change in lifestyles.

The transport network for accessibility to these centres would be largely as existing, but major intersections with the Rapid Transit route will assume greater significance to serve as nodes for the location of new, or the enlargement of existing community centres. Centres on this route will tend to become specialized office and high technology manufacturing locations, attracting employment of particular skills from all parts of the City and the surrounding region. Service facilities for the daytime as well as resident population of these district centres will tend to grow around the transit stop and the gradient for the intensity of activities as well as the density and



8

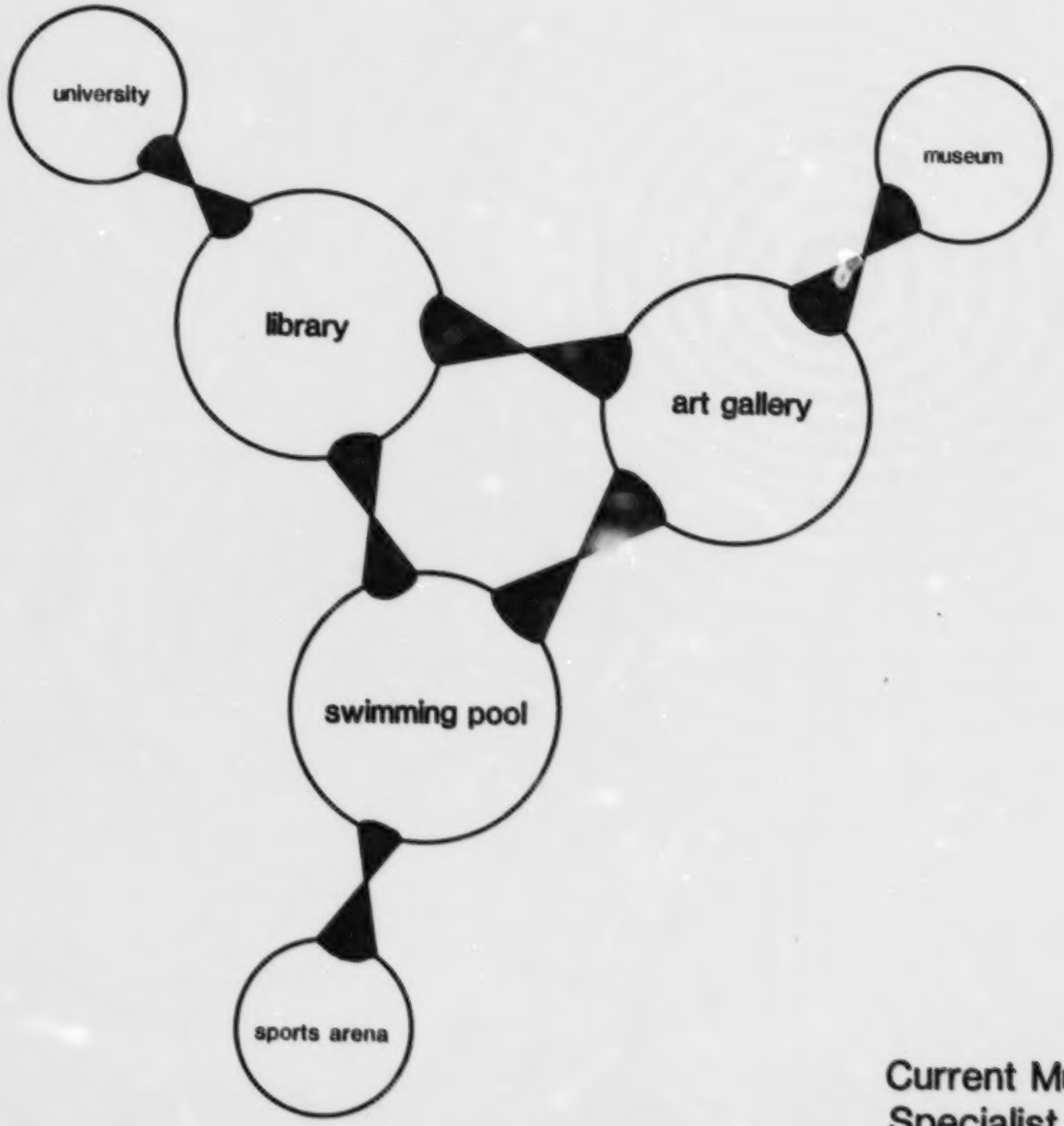
City District Silhouette

height of buildings around these stops will tend to assume a distance-decay curve in general (Diag 8).

The density of housing will tend to decrease beyond the vicinity of a district centre and it appears that quality housing in low density pockets in inner and outer suburbs will always be in demand. Home occupations related to tertiary (service) and quaternary (informatics) employment will grow substantially in all residential areas, if the respondents are permitted by their employers to work mostly at home, keeping in touch by videotext terminal.

Retail facilities will be at the heart of the distribution of facilities indicated in (a), (b) and (c) above, with downtown stores offering quality and durable goods, regional centres providing mostly durables and district centre stores undertaking large scale home delivery services in response to videophone orders. The local convenience store will consist of a variety of vending machines, as well as a perishable goods counter, the former being accessible 24-hours a day, the latter for most of the daytime and after-work evening hours.

Educational activity will continue to be institution-based at primary and secondary levels, but shift considerably to a home base - linked by videotext to college, university, research institution or public data centre - at higher education levels. Some parents will expect their more numerate and computer-oriented off-springs to teach them about the latest electronic gadgetry and robotics before purchase or use. Life-long continuing education will increasingly become the accepted way to adjust to new technology and consequent economic and social developments.


university
library
museum
art gallery
swimming pool
sports arena

9

Current Multi-purpose Trips in a Specialist Centre - University

Entertainment, cultural and recreational facilities will be located at district centres to be accessible by Rapid Transit, but will increasingly have to rely on spectacular events to attract audiences away from video substitutes at home, by offering people a sense of occasion. Recreational facilities in the residential environment will be either dispersed or located in small clusters of flexible multi-purpose spaces designed to accommodate a wide range of social, entertainment as well as recreational activities. This will be the case also with regional facilities of a unique character, offering day-long recreation or nature interpretation outings to visitors from surrounding cities and regions.

Employment centres will consist of office concentrations around transit stops in the vicinity of main road and highway intersections on one hand and industrial parks near bus stops and highway intersections on the other. Each employment centre should be planned to accommodate a specialist centre of production - computer software or hardware, automation components, consumer products, etc. - concentrating several interrelated manufacturing and service activities, including shopping, recreational and other provision for the varied needs of the workforce.

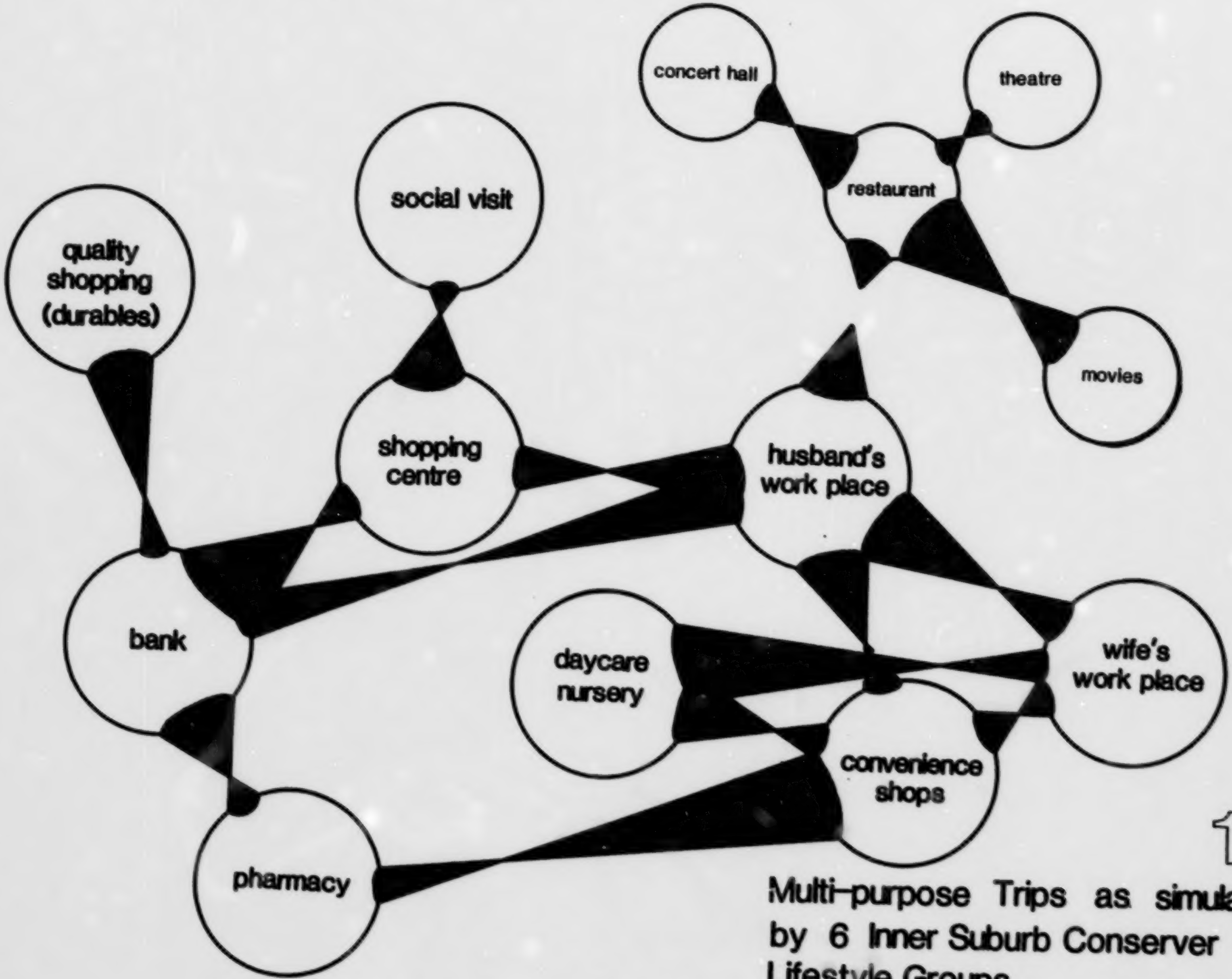
The most suitable urban form in an era of uncertainty on energy resources would be the linear city, based on private and public transportation spines, to be expandable on either side, but restricted in lateral sprawl with a designated green belt. Each specialized district centre along the public transit spine would offer the widest scope for multi-purpose trips (Diag. 9) - to maximize convenience as well as energy efficiency - while the downtown core would contain clusters of highly specialized and subsidiary activities - art gallery, concert hall, specialist shops, gourmet restaurants and government functions - which most people would visit on occasion.

Comparison with existing patterns of land use

The comparison of zoned land uses, as existing in most cities today, with the clusters shown in Diags 4-7, which are based on the linkage suggested by statistically significant multi-purpose trips, indicates a deep-rooted contrast. Economic protectionism, clinical segregation of land uses and separation of public and commercial developments, which prevented, say, a clinic or library from locating next to a supermarket in the past, could not allow for convenience - let alone energy efficiency - today or tomorrow. Participatory methods of planning and private development agreements to allow municipalities to complement existing commercial urban, district and other centres with social, medical, cultural, entertainment and educational facilities, should therefore be developed, in order to extend the scope for multi-purpose trips by the consumer, for the sake of convenience and efficiency.

Impact on Urban Planning

Preparation to respond to such an extensive number of foreseeable changes in society within a decade, implies the need for some fundamental change in attitude, methodology and education for the profession. Alternatives to land use zoning have to be explored and reliable projection methods to anticipate


concert hall
theatre
restaurant
movies
social visit
quality shopping (durables)
shopping centre
husband's work place
bank
daycare nursery
wife's work place
convenience shops
pharmacy

10

Multi-purpose Trips as simulated by 6 Inner Suburb Conserver Lifestyle Groups social and economic needs have to be developed, in order to allow planners to take timely and appropriate action in the face of rapid change. The conflict inherent in siding with disadvantaged minorities and seeking to improve vulnerable lifestyles for an energy-starved future is likely to make the political nature of planning increasingly more evident to the citizen. Armed with TELIDON and the televote, he or she will have wider access to public information, will be more eager and willing to participate in planning from the convenience of his or her home and will certainly be more anxious to cast the vote of approval or disapproval. The trend towards pluralism in an anticipatory democracy is inevitable and it is likely to call for different plans to suit different clans - i.e., special facilities, housing, densities and environment in general, for special lifestyles (Diag. 10).

In response to all these challenges, the planning process will have to be more social than technical; data collection will mean more social survey and networking with citizens, than isolated technical meetings and research; analysis will involve more thematic mapping by computer, than abstract painting with 'magic marker'; and the selection of final options will certainly call for more teleconferencing and televoting, than fiddling with option evaluation matrices.

In this decade of challenge, urban planners are likely to become more akin to social leaders, than to environmental scientists.

GA:baw-4

D2D051

Number/
Numéro

4

ONTARIO MINISTRY OF MUNICIPAL AFFAIRS AND HOUSING

ONTARIO MINISTRY OF ENERGY

CITY OF OTTAWA

ENERGY USE
AND LAND-USE PATTERNS
IN THE CITY

ECTP Study Programme

FINAL REPORT

APPENDICES

City of Ville d'Ottawa

October 1983

City of
Ville d' **Ottawa**

conservation pipeline

Knowing how our lifestyles may change will help City Council plan for a more convenient city.

Brief were the days of the oil glut bonanza at the gas pump . . . long-term gasoline price projections of the Ontario Ministry of Energy, indicate 240% to 260% increases over current prices by the year 1992.

How will your lifestyle fare with such gasoline price hikes?

To help you visualize the lifestyle change that you may have to introduce to your household to cope with this situation, the Energy Planning Section at City Hall will send you:

The Ottawa Energy Budget Game

in which the players try to recapture all the activities in their lifestyle DESPITE reductions in car mileage reflecting foreseeable gasoline price hikes. By the year 1988 you may not only have converted your car to run by propane, you may even have to buy an electric or a hydrogen car.

If you live in Billings, Dalhousie or Capital Ward, your household may be among those selected to take part in this very enjoyable survey. First you will record your trips to various facilities over the past year on a Survey Form. Then you will play the Ottawa Energy Budget Game of combining visits to convenient facilities in ROUND-TRIP fashion. The combinations you suggest will help to plan the location of new facilities in the City, so as to increase social convenience and energy conservation in our environment.

YOUR OPINION MATTERS

Tell us how to enrich Ottawa's lifestyle Even through the Energy Tight 1980's

City Council would greatly appreciate your response to this survey. Interested households beyond the selected Wards may also obtain their FREE copy of the Ottawa Energy Budget Game by calling

The City Energy Planner
(Gary Armen) at 563-3000

A token of appreciation from the Mayor will be sent for every response.

Help to make Ottawa the Energy-Efficient Capital

ONTARIO MINISTRY OF MUNICIPAL AFFAIRS AND HOUSING
ONTARIO MINISTRY OF ENERGY
CITY OF OTTAWA

ENERGY USE AND LAND-USE PATTERNS IN THE CITY

ECTP Study Programme
Final Report

APPENDICES

Ottawa

October 1983

ACKNOWLEDGEMENTS

The Survey of Energy Use and Household Trips in 1982, to establish a benchmark for the study of lifestyles in relation to energy in the City of Ottawa, involved the voluntary response to a lengthy questionnaire by no fewer than 753 households. Dozens of junior school students carried out the distribution and collection of these questionnaires and scores of teachers saw that both these tasks were properly and punctually carried out to solicit maximum response.

The Ottawa Energy Budgets Game to establish possible changes in patterns of energy use and household trip by 1992, necessitated a symposium of 12 specialists to make projections in public and private development in the Ottawa region to that year (See 'SYMPOSIUM' volume*) and subsequently involved the employment of 20 university students and the participation of over 300 households. Many of these households played and recorded their moves in the Energy Budget Game, by themselves, without waiting for help from interviewing students, thus demonstrating a remarkable patience and sense of responsibility for the future of the urban environment in Ottawa.

A debt of gratitude is due to all these households, teachers, specialists and students. It is hoped that their expectations from citizen participation in planning the location of urban facilities, in layouts which minimize car travel, will in due course, be fully realized.

---

*NOTE: The full report on this Study consists of the following volumes:

1. Summary
2. Final Report
3. Symposium
4. Appendices

APPENDICES

No.	Title	Page
1	Questionnaire on Household Trips and Energy Use, 1982	1
2	Control Sample Survey, 1982	20
3	Ottawa Energy Budgets Game	46
4	Brief note on Statistical Methods	94
5	Tables leading to the hypothesized clusters of facilities shown in Section 3	104
6	Tables of energy consumption and other socio-economic characteristics of households responding to the Ottawa Energy Budgets Game	148
7	Annotated bibliography	162

APPENDIX 1

QUESTIONNAIRE ON HOUSEHOLD TRIPS
AND ENERGY USE, 1982

IN ENGLISH AND FRENCH

CITY OF OTTAWA
CITY HALL
111 SUSSEX DRIVE
K1N 5A1
(613) 563-3251

VILLE D'OTTAWA
HOTEL DE VILLE
111, PROMENADE SUSSEX
K1N 5A1
(613) 563-3251

MARION DEWAR
MAYOR MAIRE

June 28, 1982.

Dear Householder:

As energy becomes more expensive, we all find it essential to plan its use in order to preserve our standard of living. City Council has the responsibility to do this for our City as a whole and a great deal of information is required to do it well. The Community Development Department at City Hall has selected a number of households to provide some of this information, by describing their trips to various facilities and their ideas on how to save energy.

City Council would greatly appreciate receiving your response to the questions in the attached Survey Form. Your family represents many others in the area and your response is therefore crucial for the success of this survey.

All the information you provide will be treated in strict confidence. The person who delivered this letter will call to collect it, sealed by you, in the attached envelope. Please have it ready for him in three days' time.

If you have a query on any question in the Survey Form, please do not hesitate to phone the City Energy Planner at 563-3000.

Sincerely,

Marion Dewar

Marion Dewar
Mayor

PRINTED ON RECYCLED DE-INKED PAPER • IMPRIMÉ SUR PAPIER RECYCLÉ

SURVEY OF HOUSEHOLD TRIPS AND ENERGY USE

IN JUNE 1982

PART I: GO-AND-RETURN TRIPS (To be filled by all members of your household)

The purpose of this survey is to establish the pattern of movement to various facilities used by members of your household. In the tables that follow, please indicate with a check (✓) the following:-

i. The TYPE OF TRANSPORT used: PRIVATE - e.g. car, motorcycle or other motorized type, own or leased.

PUBLIC - e.g. bus, school bus, van pool or other collective transport.

OTHER - e.g. walking, cycling or any other non-motorized type.

ii. The FREQUENCY of movement: DAILY - e.g. journey to work or to school on 5 days per week.

WEEKLY - e.g. on Sundays, or 4 times per month.

MONTHLY - e.g. once a month disregarding holidays.

OTHER - e.g. seasonal, quarterly or irregular if they occurred during 1982.

iii. The DISTANCE travelled (one way) in approximate number of kilometres per trip. If you visit several facilities of the same type - e.g. various restaurants at various times - please indicate an average distance. Each member of your household may fill in the lines which apply to his or her movements, in 10-15 minutes.

EXAMPLE:

Primary School		✓		✓				1½	01

	TYPE OF TRANSPORT			FREQUENCY				DISTANCE	
1. EDUCATIONAL FACILITIES	Private	Public	Other	Daily	Weekly	Monthly	Other	Total Approx. Kms	CODE
Primary School									01
Secondary School									02
Community College									03
University									04
Other									05
									06

2. RECREATIONAL FACILITIES	TYPE OF TRANSPORT			FREQUENCY				DISTANCE	
	Private	Public	Other	Daily	Weekly	Monthly	Other	Total Approx. Kms.	CODE
Park/Play Area									07
Sports Arena/ Playing Field									08
Tennis Court									09
Bowling Alley									10
Golf Course									11
Sailing Base									12
Swimming Pool									13
Race Track									14
Provincial Park									15
Zoo (Toronto/Montreal)									16
Botanical Gardens (Experimental Farm)									17
Cottage									18
Other (please specify)									19
									20
									21

	TYPE OF TRANSPORT			FREQUENCY				DISTANCE	
3. ENTERTAINMENT FACILITIES	Private	Public	Other	Daily	Weekly	Monthly	Other	Total Approx. Kms.	CODE
Restaurant									22
Movies									23
Theatre									24
Night Club									25
Bingo									26
Dancing									27
Other (please specify)									28
									29
4. CULTURAL FACILITIES									
Library									30
Church									31
Community Centre									32
Museum									33
Gallery									34
Concert									35
Clubs or Societies (eg. sports club, ethnic society, etc.) 1.									36
2.									37
3.									38
4.									39
5.									

	TYPE OF TRANSPORT			FREQUENCY				DISTANCE	
5. HEALTH FACILITIES	Private	Public	Other	Daily	Weekly	Monthly	Other	Total Approx. Kms.	CODE
Family Doctor									40
Dental Facility									41
Pharmacy									42
Hospital									43
Clinic									44
Other									45

	TYPE OF TRANSPORT			FREQUENCY				DISTANCE	
6. SHOPPING FACILITIES	Private	Public	Other	Daily	Weekly	Monthly	Other	Total Approx. Kms.	CODE
Convenience or Neighb'd Store									47
Shopping Centre									48
Bank									49
Other (please specify)									50
									51

7. MUNICIPAL OR OTHER GOVERNMENT SERVICES (not related to your employment)	TYPE OF TRANSPORT			FREQUENCY				DISTANCE	
	Private	Public	Other	Daily	Weekly	Monthly	Other	Total Approx. Kms.	CODE
City Hall									52
Regional Government									53
Provincial Ministry									54
Federal Ministry									55

8. JOURNEY TO WORK

Husband									56
Wife									57
Others: 1.									58
2.									59
3.									60
4.									61

9. SOCIAL VISITS

(Relative) (Friend or) (Acquaintance)	1.									62
	2.									63
	3.									64
	4.									65
	5.									66
Please continue as necessary	6.									67
	7.									68
	8.									69

Part 2: ROUND TRIPS (To be filled by all members of the family).

10. Do you visit some facilities or locations on a 'round trip'? For example:-

DESCRIPTION OF TRIP	ROUND TRIP TO FACILITIES OR LOCATIONS
1. Leaving child at school on your journey to work	Home-School-Work-Home
2. Buying milk from convenience store on return from work	Home-Work-Store-Home

Please describe your round trips below:-

1.	70
2.	71
3.	72
4.	73
5.	74
6.	75

11. What other facilities would you like to be able to visit on round trips, if it were possible?

76

77

78

79

12. What other ways have you used to save energy in transportation? (e.g. car pooling)

80

81

82

Part 3: ENERGY USE (To be completed by the head of the household) CODE

The following questions are related to the consumption and cost of energy for various household purposes.

13. What is the approximate total annual kmileage (no. of kms) travelled by the car(s) used by your household? (check) 80

Less than 5,000 ☐	15,001 - 20,000 ☐
5,000 - 10,000 ☐	20,001 - 25,000 ☐
10,001 - 15,000 ☐	Over 25,000 ☐

14. Approximately how much is spent per year by your household for the maintenance, insurance and purchase of gasoline to run the cars(s) used?

_______________ 81

15. What is the approximate total annual amount spent by your household for bus or other public transit journeys.

_______________ 82

16. Please complete the following table:

Types of energy used by your household	Purpose(s)* for which it is used	Approximate annual cost ($) to the household	
1. Electricity			83
2. Nat. gas			84
3. Oil			85
4. Gasoline			86
5. Solar			87

*Please use one or several of the following initials as a code: -

S = Space heating B = Battery warming A = Indoor/outdoor appliances

W = Water heating L = Lighting T = Travel

17. What ways have you used to save energy at home?

1. _______________ 88
2. _______________ 89
3. _______________ 90
4. _______________ 91
5. _______________ 92
6. _______________ 93
7. _______________ 94
8. _______________ 95

18. What would be your suggestions to the Council to help people to save energy?

1.	96
2.	97
3.	98
4.	99
5.	100
6.	101
7.	102
8.	103
9.	104
10.	105

19. Please indicate the approximate age, occupation and level of education of each member of your household (no names need be indicated)

Member	Age	Occupation	Education	
1.				106-9
2.				110-3
3.				114-7
4.				118-1
5.				122-3
6.				124-7

20. Which of the following indicates the approximate total net income (i.e. after tax) of all the working members of your household? (check)

Less than $10,000 ☐	$20,000-$30,000 ☐	
$10,000-$20,000 ☐	Over $30,000 ☐	128-1

Thank you for your co-operation in this survey. All information will be treated as confidential. This survey form will be collected within 3 days. If you are not likely to be available at the time, please call 563-3000.

6A:cmm-5
A28024

COMMUNITY DEVELOPMENT
DÉVELOPPEMENT COMMUNAUTAIRE

OTTAWA

CITY HALL
111 SUSSEX DRIVE

HÔTEL DE VILLE
111, PROMENADE SUSSEX

K1N 5A1

ROBERT BAILEY
COMMISSIONER-COMMISSAIRE

IN REPLY PLEASE QUOTE
EN RÉPONDANT CITEZ CETTE LETTRE

SURVEY ON HOUSEHOLD TRIPS AND ENERGY USE

I called to collect the completed questionnaire on this survey. Unfortunately, you were not available.

YOUR OPINION MATTERS

Please send the completed questionnaire as soon as possible by mail, addressing it to:

THE CITY ENERGY PLANNER
CITY HALL
111 SUSSEX DRIVE
OTTAWA, ONTARIO
K1N 5A1

Otherwise please call him at: 563-3000

Thank you for taking the time to make your opinion count.

GA:smc-3
A6B017

CITY OF OTTAWA
CITY HALL
111 SUSSEX DRIVE
K1N 5A1
(613) 563-3251

VILLE D'OTTAWA
HOTEL DE VILLE
111, PROMENADE SUSSEX
K1N 5A1
(613) 563-3251

MARION DEWAR
MAYOR MAIRE

le 29 juin 1982

Au résident,

Plus l'énergie coûte, plus nous sentons le besoin d'en planifier l'utilisation pour maintenir notre niveau de vie. Le Conseil municipal doit effectuer cette planification pour l'ensemble de la ville, mais pour bien le faire, il lui faut beaucoup de renseignements. Le Service du développement communautaire à l'Hôtel de ville a choisi un certain nombre de ménages qui lui fourniront ces renseignements en faisant la description de leurs déplacements et en donnant des idées sur les façons d'économiser l'énergie.

Vous aiderez le Conseil municipal en remplissant le questionnaire ci-joint. Votre famille dépeint bien d'autres familles du secteur, alors votre participation est essentielle au succès de ce sondage.

Tous les renseignements que vous fournirez seront strictement confidentiels. La personne qui vous remettra la présente lettre vous téléphonera avant de passer prendre le questionnaire et vous n'avez qu'à le lui remettre dans l'enveloppe ci-jointe bien scellée.

Si vous désirez des précisions sur l'une des questions du questionnaire, n'hésitez pas à communiquer avec l'urbaniste chargé des questions énergétiques (563-3000).

le Maire,

Marion Dewar

Marion Dewar

SONDAGE SUR LES DÉPLACEMENTS DE LA FAMILLE
ET L'UTILISATION DE L'ÉNERGIE
EN JUIN 1982

1. Voyages aller et retour. À remplir par chacun des membres de la famille.

Le but du présent sondage est d'arriver à obtenir une image des déplacements effectués par les membres de votre famille vers diverses destinations. Veuillez indiquer par une coche dans les tableaux suivants:

i. Le genre de moyen de transport utilisé:

privé: p.ex. auto, motocyclette ou autre moyen motorisé, personnel ou loué.

public: p.ex. autobus, autobus scolaire, auto commune, ou autre moyen collectif de transport.

autre: p.ex. marche, bicyclette ou autre moyen non motorisé.

ii. La fréquence des déplacements:

quotidiens: p.ex. pour aller au travail ou à l'école cinq jours par semaine.

hebdomadaires: p.ex. le dimanche, ou quatre fois par mois.

mensuels: p.ex. une fois par mois, sans tenir compte des jours de congé.

autre: p.ex. saisonniers, trimestriels ou irréguliers, s'ils sont survenus en 1982.

iii. Distance approximative parcourue (*dans un sens*) en kilomètres, par déplacement. Si vous allez à plusieurs destinations du même genre, (p.ex. des restaurants différents à des heures différentes) indiquez une distance *moyenne*. Chacun des membres de votre famille peut répondre sur les lignes qui s'appliquent à ses déplacements, en 10 ou 15 minutes.

EXEMPLE:

École primaire		✓		✓				1½	

1. ÉTABLISSEMENTS D'INSTRUCTION	MOYEN DE TRANSPORT ci-dessus			FREQUENCE ci-dessus				DISTANCE ci-dessus	
	PRIVÉ	PUBLIC	AUTRE	QUOTIDIENS	HEBDOMAD'S	MENSUELS	AUTRE	Total approx. en kms.	CODE
École primaire									01
École secondaire									02
Collège communautaire									03
Université									04
Autre									05
									06

	MOYEN DE TRANSPORT			FRÉQUENCE				DISTANCE	
2. INSTALLATIONS DE LOISIRS	PRIVÉ	PUBLIC	AUTRE	QUOTIDIENS	HEBDOMAD'S	MENSUELS	AUTRE	Total approx. en kms.	CODE
Parc, terrain de jeux									07
Terrain de sport, patinoire									08
Court de tennis									09
Jeu de quilles									10
Terrain de golf									11
Club nautique									12
Piscine									13
Champ de course									14
Parc provincial									15
Jardin zoologique (Toronto, Montréal)									16
Jardins botaniques (ferme expérimentale)									17
Cottage/Chalet									18
Autre (veuillez préciser)									19
									20
									21

	MOYEN DE TRANSPORT			FRÉQUENCE				DISTANCE	
3. LIEUX DE DIVERTISSEMENT	PRIVÉ	PUBLIC	AUTRE	QUOTIDIENS	HEBDOMAD'S	MENSUELS	AUTRE	Total approx. en kms	CODE
Restaurant									22
Cinémas									23
Théâtre									24
Boîte de nuit									25
Bingo									26
Danse/Bal									27
Autre (Veuillez préciser)									28
									29

4. INSTALLATIONS CULTURELLES	MOYEN DE TRANSPORT			FRÉQUENCE				DISTANCE	
	PRIVÉ	PUBLIC	AUTRE	QUOTIDIENS	HEBDOMAD'S	MENSUELS	AUTRE	Total approx. en kms	CODE
Bibliothèque									30
Église									31
Centre communautaire									32
Musée									33
Galerie									34
Concert									35
Clubs ou sociétés, (p.ex. club sportif, société ethnique, etc.)									36
									37
									38
									39

5. SANTÉ

Médecin de famille									40
Dentiste									41
Pharmacie									42
Hôpital									43
Clinique									44
Autre									45

6. EMPLETTES

Boutique locale									47
Centre d'achats									48
Banque									49
Autre (veuillez préciser)									50
									51

7. SERVICES GOUVERNEMENTAUX, MUNICIPAL OU AUTRE (SANS RAPPORT AVEC VOTRE EMPLOI)	MOYEN DE TRANSPORT			FRÉQUENCE				DISTANCE	
	PRIVE	PUBLIC	AUTRE	QUOTIDIENS	HEBDOMAD'S	MENSUELS	AUTRE	Total approx. en kms	CODE
Hôtel de ville									52
Gouvernement régional									53
Ministère provincial									54
Ministère fédéral									55

8. DÉPLACEMENT POUR LE TRAVAIL

Époux									56
Épouse									57
Autres: 1.									58
2.									59
3.									60
4.									61

9. VISITES

(Parent, ami ou connaissance). 1.									62
2.									63
3.									64
4.									65
5.									66
Continuez si nécessaire 6.									67
7.									68
8.									69

Partie 2: Déplacements circulaires (à remplir par tous les membres de la famille).

10. Y a-t-il des déplacements où vous passez par plusieurs destinations avant de revenir chez vous? Par exemple:

DESCRIPTION DU DÉPLACEMENT	DESTINATIONS	
1. Laisser un enfant à l'école en vous rendant au travail	Maison - école - travail - maison	
Décrivez ci-dessous vos déplacements circulaires:		CODE
1.		70
2.		71
3.		72
4.		73
5.		74
6.		75

11. Quelles sont les autres destinations auxquelles vous aimeriez vous rendre pendant des déplacements circulaires, si c'était possible.

76

77

12. Quels sont les autres moyens utilisés par vous afin d'économiser l'énergie dans vos déplacements? (par ex. usage en commun d'une automobile)

78

79

Partie 3. Utilisation de l'énergie - (À remplir par le chef de famille) CODE

Les questions qui suivent se rapportent à la consommation et au coût de l'énergie à diverses fins dans la maison.

13. Quel est à peu près le nombre de kilomètres parcourus par l'auto ou les autos utilisées par la famille en une année (Cochez).

Moins de 5 000$ ☐
10 001 - 15 000$ ☐
20 001 - 25 000 $ ☐
5001 - 10 000$ ☐
15 0001 - 20 000$ ☐
plus de 25 000$ ☐

80

14. Combien vous coûte chaque année votre auto pour l'entretien, l'assurance et l'essence?

81

15. Quel est, à peu près, le montant total dépensé par votre famille pour les déplacements en autobus ou autres moyens de transport en commun?

82

16. Veuillez remplir le tableau suivant:

Sources d'énergie utilisées dans votre maison (cochez)	Utilisations*	Coût annuel approximatif (en $)	
1. Électricité ☐			83
2. Gaz ☐			84
3. Mazout ☐			85
4. Essence ☐			86
5. Énergie solaire ☐			87
6. Autres (précisez) ☐			88

*Prière d'utiliser l'un des codes suivants:

M - chauffage de la maison
B - réchauffage de la batterie
E - chauffage de l'eau
L - lumière
A - appareils ménagers
V - voyages

17. Quelles mesures avez-vous prises pour épargner l'énergie chez vous?

1.	89
2.	90
3.	91
4.	92
5.	93
6.	94
7.	95

18. Que proposeriez-vous au Conseil municipal pour aider les gens à épargner l'énergie?

1.	96
2.	97
3.	98
4.	99
5.	100
6.	101
7.	102
8.	103
9.	104
10.	105

19. Prière d'indiquer l'âge approximatif, les occupations, et les niveaux d'étude de chacun des membres de votre famille (inutile de donner le nom)

Membre	Âge	Occupation	Études	CODE
1.				106-9
2.				110-3
3.				114-7
4.				118-1
5.				122-3
6.				124-7

20. Quel est le revenu total net (c'est-à-dire après retenue des impôts) de tous les membres de votre famille qui travaillent (cochez)

Moins de 10 000$ ☐ 20 000 - 30 000$ ☐
10 000 à 20 000$ ☐ plus de 30 000$ ☐

128-1

Merci de votre coopération. Tous les renseignements seront considérés comme confidentiels. Cette formule de sondage sera ramassée dans les trois jours qui suivent. Si vous croyez être absent, appelez-nous à 563-3000.

APPENDIX 2

CONTROL SAMPLE SURVEY
AND COMPARISON WITH
LARGE SAMPLE (1982) SURVEY

SURVEY OF HOUSEHOLD TRIPS AND ENERGY USE

1. INTRODUCTION

This survey asked for details of trips by all members of each household. These details include mode of transportation, frequency, and distance travelled for each destination category. Over 60 destination categories were used. Other questions included household expenditures on energy, car and public transit use, and household characteristics including the age, occupation and education of each household member.

The survey results reported here are for approximately 100 households, from a sample of households approached in the late summer of 1982. Households in the sample were scattered throughout the "Inner City","Inner Suburb" and "City Suburb" areas of Ottawa. Information is given in this report about the conduct of the survey, and information arising from that experience. This is followed by a summary of results from the survey. Results from Part I, "GO-AND-RETURN TRIPS", were tabulated by computer, and include aggregations to each major categorization of destinations. Results from Part II, "ROUND TRIPS", and from Part III, "ENERGY USE", were tabulated manually, because it would not be cost effective to use a computer for these data until crosstabulations or other data analysis is undertaken. Interval variables such as age were placed in categories for manual tabulation for this report. Full codes for these variables were placed on the questionnaires to facilitate further analysis. It was not within the scope of this project to develop coding schemes for open, non-quantitative questions.

2. CONDUCT OF SURVEY

2.1. QUESTIONNAIRE DISTRIBUTION

Procedures for distribution and retrieval of questionnaires were constrained by the need to remain consistent with previous distributions, and to achieve a high response rate from a relatively small sample of households. Questionnaires were delivered to households and later retrieved. Whenever possible, the researcher delivering questionnaires met with householders to answer questions and to arrange pickup times and locations (e.g. mail boxes). Those delivering questionnaires were provided with letters of identification. Virtually no substitutions were made from the sample as drawn, in order to protect the validity of the results.

A covering letter from Socioscope in the language appropriate to the questionnaire was added to the letter from the City of Ottawa, as well as a blank envelope. The added letter included telephone numbers for assistance, and for delivery of a replacement questionnaire in the alternate official language. Telephones were answered in the language of the caller, and messages could be left outside of business hours. Most calls were merely to obtain a questionnaire in the alternate language. A number of households asked for the questionnaires in English, although the spoken language was French, reducing somewhat the apparent proportion of francophones in the survey.

The sample included households on lists provided by the City of Ottawa. Of these households, it was impossible for some to complete questionnaires for the following reasons:

Language difficulties	3
Illness	1
Apparent extended absense of occupants	3
No house at location	2
Very recent occupancy, with no knowledge of costs or neighbourhood	3
Completed questionnaire on previous survey.	1
Total	13

These are known cases of households from which no response could be expected. After removal of these cases, the number of households receiving the questionnaire was approximately 145.

2.2 RETRIEVAL OF QUESTIONNAIRES

The questionnaires were retrieved by research staff, usually after confirmation by telephone of completion. If questionnaires were not ready at the date set, or if the householder was not available when the researcher called, a second retrieval date was arranged. Some households were visited three or four times. Questionnaires lost by respondents were replaced. Assistance in completion of questionnaires was provided upon request. To assure confidentiality, questionnaires were sealed in plain envelopes, which were marked only with broad geographic codes. After opening, geographic codes were added to the questionnaires, and questionnaires were separated from information that could associate them with an address.

A total of 112 questionnaires were retrieved. This represents a return rate of approximately 75% of those households for which completion was not definitely ruled out (see above). Of the questionnaires obtained, approximately 11 were found to be blank when the envelopes were opened. However, the effective return rate remains high for this type of questionnaire.

For a number of households, of course, questionnaires could not be retrieved. Each household was visited three times, and attempts were made to contact each household by telephone to arrange questionnaire completion or obtain reasons for non-completion. Some people listed were no longer at the addresses given, and because the names of the new householders were unknown, it was impossible to reach these people by telephone. In other cases, householders had unlisted telephone numbers.

2.3 RESPONSE QUALITY

Questionnaires of this degree of complexity are most likely to be successfully completed by those with more formal education or in managerial or professional occupations. In spite of the efforts to obtain a high response rate, the sample may be biased because of this factor. A preliminary examination of geographic, language, education, age and occupation variables suggests the existence of only this expected bias. Some of the difficulties evident from respondents were:

1. For Part I of the questionnaire, some respondents used more than one type of transport for certain destinations. Some respondents filled in more than one mode. Provision could be made to distinguish frequency of use of each type of transport.

2. Some respondents had difficulty answering questions in terms of kilometres, and desired a choice between miles and kilometres.

3. Multiple choice categories for estimation of costs were preferred to open questions.

4. More detailed information regarding uses of the survey would be helpful. Respondents expressed a desire for a clear idea of planning uses forseen for their answers.

It appears that most of the feedback from respondents could be accommodated by a pamphlet explaining how to answer certain questions, and why questions are being asked. Respondents also commented on being surveyed in the summer, when they were away on weekends or had just returned from vacation, or were about to leave. Perhaps the response rate would be improved by an earlier or later survey date.

3. RESULTS

The results were tabulated for the non-blank questionnaires. Those from Part I were tabulated by computer; the rest were tabulated manually for this report. In addition to the marginals for the questions, the following information was tabulated:

Geographic Categories:

Inner City	22
Inner Suburbs	38
City Suburbs	38
Unknown	2

Language of Questionnaire Returned:

English	90
French	10

Note: A much larger number of questionnaires were delivered in French. This was done if the name suggested the existence of a francophone household or if preference was expressed for a French questionnaire. However, some francophone households preferred using a questionnaire in English, thus distorting the apparent language distribution.

3.1. PART I "GO-AND-RETURN TRIPS"

The results for Part I are given in the computer printout. In addition to reporting the mode, frequency and distance summaries for each of the destinations, an aggregated report is given for each of the major destination categorizations. For the distance variables, averages are given rather than a direct listing (because they are not recorded as categorical variables). For distances travelled, the following figures are reported:

- Number of Households sith trips to destination.

- Average trip distance (in kilometres) for these trips.

- Average monthly distance travelled to the destination, with distances weighted by frequency as follows:

daily	20
weekly	4
monthly	1
other	.25

- Average trip distance to destination for all households in the survev (not just those which had trips to the destination).

- Average monthly distance travelled to the destination for all households in the survey (not just those which had trips to the destination).

3.2. PART II "ROUND TRIPS"

The questions in this section were open and were not tabulated as part of this project.

3.3. PART III "ENERGY USE"

The results shown below are for those who provided responses to the particular questions.

Q13: Total Annual Distance Travelled By Car

No car	9%
Less than 5000 (km)	14
5 000-10 000	23
10 000-15 000	21
15 000-20 000	12
20 000-25 000	5
Over 25 000	16

Q14: Annual Car Costs

Average	$1 692

Q15: Annual Public Transit Costs

Average	$271

Q16:

Electricity

Average	$380

Natural Gas

Average	$117

Oil

Average	$527

Gasoline

Average	$541

Solar

Average	0

Note: As with other questions in this section the percentages shown are for those who answered at least part of the section. Evidently, some answers were incomplete (as in Lighting, below). Percentages should not add to 100 because some households did not use energy for all purposes, and multiple uses are possible.

Space Heating

Electricity	19%
Natural Gas	17
Oil	72
Gasoline	0
Solar	1

Water Heating

Electricity	48%
Natural Gas	14
Oil	5
Gasoline	0
Solar	0

Battery Warming		
	Electricity	15%
	Others	0
Lighting		
	Electricity	83%
	Gasoline	1
	Solar	1
	Others	0
Appliances		
	Electricity	70%
	Natural Gas	4
	Oil	1
	Gasoline	4
	Solar	0
Travel		
	Electricity	1%
	Natural Gas	0
	Oil	4
	Gasoline	54
	Solar	0

Q19:

Note: Percentages for this question are for the aggregate of all individuals, not households.

Age	
Less than 20	23%
20-29	18
30-49	29
50 and older	31

Occupation	
Student	24%
Homemaker	13
Retired/Unemployed	13
White collar, working class	10
Blue collar, working class	13
Professional/Managerial	26
Self employed/owner	2

Education	
Elementary	15%
Some high school	22
Completed high School	23
Community College	4
Some University	5
University degree	28

Q20: Total Net Income of Household

Less than 10 000	17
10 000 - 20 000	17
20 000 - 30 000	19
Over 30 000	48
Household Size	
Average	2.977

APPENDIX

STREET ADDRESSES OF RESPONDENTS

1. INNER CITY

22 HAZEL ST.

319 CLEMOW AVENUE

199 HOPEWELL AVENUE

25 FENTIMAN AVENUE

7 OSSINGTON AVENUE

20 ADELAIDE STREET

244 FRANK STREET

23 NOLAN STREET

3 LINDEN TERRACE

374 FIRST AVENUE

21 STEWART STREET

47 HENDERSON AVENUE

301 OSGOODE

44 GORDON STREET

221 NEPEAN STREET

479 WILBROD STREET

283 CLARENCE STREET

14 FINDLAY AVENUE

21 FENTIMAN AVENUE APT. 1

170 BOOTH STREET APT. 509

54 CENTENNIAL BOULEVARD APT. 2

280 COBOURG

30 CENTENNIAL BOULEVARD

184 GLEBE AVENUE

2. INNER SUBURBS

296 PRESLAND ROAD
359 WILMONT AVENUE
875 BORTHWICK AVENUE
1332 AVENUE R
373 SPARTAN AVENUE
1956 MICHIGAN AVENUE
1458 CLONTARF AVENUE
933 HARKNESS AVENUE
164 FANSHAW AVENUE
2364 TAMPA AVENUE
1076 RICHARD AVENUE
1950 CAMBORNE CRESCENT
48 ONTARIO STREET
494 BRAYDON AVENUE
2570 EGAN ROAD
23 EDINA STREET
20 HILDA STREET
121 PUTNAM AVENUE
185 WILBER STREET
1232 TRENTON AVENUE
876 DENISON CRESCENT
622 MALARTIC AVENUE
113 PRINCE ALBERT
442 BRIAR AVENUE
108 SPADINA AVENUE
7 BIRCH AVENUE
396 APPLE TREE LANE

1299 LAPERRIERE AVENUE

2032 BAFFIN AVENUE

1427 PORTAL STREET

641 PARKVIEW ROAD

287 ATLANTIS AVENUE

1233 SHILLINGTON AVENUE

934 HAMILTON AVENUE SOUTH

121 PRINCE ALBERT STREET

57 MELROSE APT. 2

538 MUTUAL STREET

484 BRAYDON AVENUE

3. CITY SUBURBS

577 COLE AVENUE

1414 PLUMBER AVENUE

928 CHAPMAN BOULEVARD

616 NOBLE CRESCENT

810 PLEASANT PARK ROAD

2354 BLACKSTONE CRESCENT

810 RAGLAN AVENUE

1201 ERINDALE DRIVE

169 BRADFORD STREET

858 FOREST STREET

952 DRESDEN CRESCENT

1101 AGINCOURT ROAD

2208 ANTHONY AVENUE

1573 AINSLEY DRIVE

1880 WEMBLY AVENUE

2395 SUDBURY AVENUE

2249 DOMLATCHY PLACE

41 WYLIE AVENUE

2791 FALLIS AVENUE

999 CASTLEHILL CRESCENT

2060 HARMANY AVENUE

593 HIGHLAND AVENUE

1808 GILBERT AVENUE

677 WESTON DRIVE

2063 HAYMARKET STREET

121 HAWK CRESCENT

73 GREENBORO CRESCENT

1349 PEBBLE PLACE

2269 HORTON STREET

2738 KELLY AVENUE

10 CHASE COURT

2976 FAIRLEA CRESCENT

15 HUNTMASTER LANE

1170 WHITEMORE AVENUE

2122 RICE AVENUE

2098 VALLEY DRIVE

2451 ROSEWOOD AVENUE

2005 BANFF AVENUE

1982 PATTERNS OF HOUSEHOLD TRIP AND ENERGY USE

Key Findings According to Control Sample (A) and Large Sample (B) Analysis

A. HOUSEHOLD TRIPS TO VARIOUS FACILITIES BY TRANSPORT MODE (%)

Destination		Private Car		Public Transport		Other (cycling walking, etc.)		Several modes	
		A	B	A	B	A	B	A	B
Primary School		12.0	18.1	24.0	31.0	64.0	50.9	----	----
Secondary School		17.6	16.7	52.9	54.9	29.5	28.4	----	----
Community College		50.0	43.6	20.0	31.0	20.0	15.4	10.0	10.0
University		41.7	35.5	25.0	32.7	33.3	31.8	----	----
Other (educ'l)	1	36.4	39.2	18.2	17.9	27.3	23.6	18.2	19.3
	2	----	----	----	33.3	----	66.7	----	----
Park/Play area		20.0	2.1	4.4	5.2	64.4	66.7	11.2	26.0
Sports Arena		40.7	43.0	3.7	7.5	44.4	39.6	11.2	9.9
Tennis Court		35.7	35.1	14.3	9.6	50.0	55.3	----	----
Bowling Alley		84.6	65.4	16.4	25.0	----	9.6	----	----
Golf Course		92.8	96.2	7.2	3.1	----	0.7	----	----
Sailing Base		42.8	50.5	28.8	22.6	14.2	10.3	14.2	16.6
Swimming Pool		41.9	43.7	13.0	14.9	35.5	34.9	9.6	6.5
Race Track		80.0	86.2	----	4.1	20.0	9.7	----	----
Provincial Park		89.5	81.3	----	10.3	10.5	8.4	----	----
Zoo		80.0	80.3	20.0	16.5	----	----	----	3.2
Botanical Gardens		55.0	57.3	5.0	6.9	20.0	22.7	20.0	13.1
Cottage		88.9	91.8	3.7	2.9	3.7	1.3	3.7	4.0
Other (rec'l)	1	70.6	74.4	5.9	6.3	23.5	18.4	----	0.9
	2	----	82.8	----	4.7	----	11.0	----	1.5
	3	----	71.2	----	9.3	----	16.0	----	3.5

Destination		Private Car		Public Transport		Other (cycling walking, etc.)		Several modes	
		A	B	A	B	A	B	A	B
Restaurant		72.0	74.1	8.0	9.4	10.0	10.5	10.0	6.0
Movies		64.9	62.3	12.7	15.8	8.8	9.9	14.0	12.0
Theatre		77.4	72.9	9.7	10.3	9.7	9.8	3.2	7.0
Night Club		68.8	70.1	----	2.2	6.2	7.1	25.0	20.6
Bingo		85.7	84.0	----	3.4	14.3	12.6	----	----
Dancing		84.6	79.4	7.6	7.9	7.6	9.7	0.2	3.0
Other (entm't)	1	100.0	82.6	----	4.3	----	13.0	----	----
	2	----	90.0	----	2.1	----	7.0	----	0.9
Library		40.0	41.5	14.0	15.2	36.0	34.3	10.0	9.0
Church		71.2	70.2	5.1	7.1	18.6	19.7	5.1	3.0
Community Centre		37.5	33.7	6.3	9.3	43.8	47.0	2.4	10.0
Museum		53.1	54.4	12.5	15.1	25.0	22.6	9.4	7.9
Gallery		59.1	49.9	9.1	19.1	22.7	22.8	9.1	8.2
Concert		80.6	78.6	3.2	8.3	16.1	10.4	0.1	2.7
Clubs	1	76.7	70.6	3.3	9.8	10.0	12.6	10.0	7.0
	2	----	51.5	----	21.2	----	27.3	----	----
	3	----	69.2	----	30.8	----	----	----	----
	4	----	42.9	----	30.6	----	14.3	----	12.2

Destination		Private Car		Public Transport		Other (cycling walking, etc.)		Several modes	
		A	B	A	B	A	B	A	B
Family doctor		36.1	32.5	18.2	20.1	37.4	38.3	8.3	9.1
Dental facility		43.2	44.8	26.3	22.9	20.3	19.7	10.2	12.6
Pharmacy		46.7	46.8	29.2	25.6	16.9	18.5	7.2	9.1
Hospital		60.3	64.9	26.3	21.0	1.8	4.1	11.6	10.0
Clinic		36.7	43.7	20.1	30.7	38.7	24.6	4.5	1.0
Other (med'l)	1	37.4	36.5	24.4	26.8	26.2	26.0	12.0	10.7
	2	----	98.0	----	2.0	----	----	----	----
Convenience shops		46.6	43.5	2.7	3.5	34.2	36.2	16.5	16.8
Shopping centre		70.5	70.2	7.3	11.5	6.3	8.3	15.9	10.0
Bank		48.9	52.5	12.0	10.5	26.1	26.0	13.0	11.0
Other (shopping)	1	50.0	67.6	16.6	14.3	----	1.2	16.6	16.9
	2	----	65.1	----	23.3	----	10.6	----	1.0
City Hall		73.6	64.9	20.1	22.5	3.2	9.6	3.1	3.0
Regional Gov't		41.4	45.2	46.2	35.5	4.2	9.0	8.2	10.3
Provincial Ministry		45.3	46.3	38.6	35.6	8.8	8.9	7.3	9.2
Federal Ministry		46.1	49.1	32.1	29.8	16.2	15.1	5.6	6.0

Destination	Private Car		Public Transport		Other (cycling walking, etc.)		Several modes	
	A	B	A	B	A	B	A	B
Husband's journey to work	67.2	58.7	17.2	25.4	10.9	10.8	4.7	5.1
Wife's journey to work	47.7	48.1	27.2	30.6	13.6	14.0	11.5	7.3
Sibling 1 (work)	34.6	34.6	38.5	38.4	19.2	20.1	7.7	6.9
Sibling 2 (work)	24.1	28.8	52.1	50.1	23.6	21.0	0.2	0.1
Sibling 3 (work)	69.3	66.7	11.6	12.7	19.0	17.7	0.1	2.9
Social visits 1	68.2	61.4	13.2	10.8	19.2	27.1	0.4	0.7
Social visits 2	53.4	52.7	24.3	24.5	21.5	19.8	0.8	3.0
Social visits 3	49.6	49.1	18.8	26.3	31.0	20.6	0.6	4.0
Social visits 4	30.1	32.9	26.9	33.4	41.8	23.7	1.2	10.0
Social visits 5	13.4	68.4	32.7	8.8	53.9	22.8	----	----
Social visits 6	13.4	65.6	32.7	12.5	53.9	21.9	----	----
Social visits 7	----	57.9	----	23.5	----	20.0	----	3.5
Social visits 8	----	51.2	----	26.1	----	19.3	----	3.4

B. FREQUENCY OF TRIPS TO VARIOUS FACILITIES IN 1982 (%)

Destination		Daily	Weekly	Monthly	Other
Primary School		92.9	3.6	3.6	----
Secondary School		87.4	5.3	1.1	6.3
Community College		37.3	30.0	2.5	30.0
University		57.0	26.2	4.7	12.1
Other (educ'l)	1	54.8	25.8	1.6	17.7
	2	66.7	33.3	----	----

Park/Play area		32.6	46.0	7.1	14.2
Sports Arena		17.6	51.9	12.2	18.3
Tennis Court		18.7	41.8	15.4	24.2
Bowling Alley		2.0	38.8	18.4	40.8
Golf Course		5.1	34.6	26.9	33.3
Sailing Base		2.4	35.7	23.8	38.1
Swimming Pool		16.9	41.6	16.3	25.3
Race Track		4.0	28.0	24.0	44.0
Provincial Park		1.0	8.6	31.4	59.0
Zoo		----	----	3.3	96.7
Botanical Gardens		2.0	10.8	36.3	51.0
Cottage		1.3	45.2	18.1	35.5
Other (rec'l)	1	3.1	50.0	15.6	31.3
	2	6.5	45.2	19.4	29.0
	3	5.0	50.0	----	45.0

Destination		Daily	Weekly	Monthly	Other
Restaurant		3.8	42.5	37.8	16.0
Movies		0.3	19.5	49.2	31.0
Theatre		----	6.9	45.0	48.2
Night Club		----	38.6	34.1	27.3
Bingo		4.3	56.5	17.4	21.7
Dancing		----	30.2	34.9	34.9
Other (entm't)	1	8.7	30.4	26.1	34.8
	2	13.3	40.0	13.3	33.3
Library		1.1	38.8	39.5	20.5
Church		3.3	73.3	11.4	12.1
Community Centre		4.8	33.7	28.9	32.5
Museum		----	7.0	36.4	56.7
Gallery		----	9.3	31.7	59.7
Concert		----	5.1	41.7	53.2
Clubs	1	3.6	41.6	29.2	25.5
	2	3.0	42.4	24.2	30.3
	3	15.4	23.1	30.8	30.8
	4	----	42.9	28.6	28.6
Family doctor		----	2.9	23.2	73.9
Dental facility		0.3	0.5	7.7	91.5
Pharmacy		0.6	15.6	34.7	49.0
Hospital		1.4	5.6	10.2	82.8
Clinic		----	4.9	14.8	80.8
Other (med'l)	1	4.8	14.3	23.8	57.1
	2	66.7	33.3	----	----

Destination	Daily	Weekly	Monthly	Other
Convenience shops	24.0	54.1	9.9	12.1
Shopping centre	4.0	76.0	11.1	8.9
Bank	1.2	71.2	17.3	10.2
Other (shopping) 1	----	55.2	24.1	20.7
2	2.3	53.5	37.2	7.0
City Hall	5.5	3.3	12.1	79.1
Regional Gov't	3.3	3.3	10.0	83.3
Provincial Ministry	----	6.3	3.1	90.6
Federal Ministry	7.0	8.8	10.5	73.7
Husband's journey to work	90.1	5.0	0.3	4.7
Wife's journey to work	82.5	11.2	0.9	5.4
Sibling 1 (work)	81.7	11.9	0.8	5.6
Sibling 2 (work)	52.8	30.6	----	16.7
Sibling 3 (work)	40.0	----	----	60.0
Social visits 1	9.6	51.0	21.4	17.9
Social visits 2	7.2	37.8	29.7	25.3
Social visits 3	1.8	38.7	27.6	31.9
Social visits 4	5.3	31.6	22.1	41.1
Social visits 5	5.4	19.6	23.2	51.8
Social visits 6	3.2	9.7	32.3	54.8
Social visits 7	6.3	6.3	12.5	75.0
Social visits 8	9.1	18.2	9.1	63.6

C. ENERGY USE

1. Total Annual Distance Travelled By Car

	%
No car families	9
Less than 5000 (km)	14
5 000-10 000	23
10 000-15 000	21
15 000-20 000	12
20 000-25 000	5
Over 25 000	16

2. Annual Expenditure on Car per household

Average	$1,692.00

3. Annual Public Transit Expenditure per household

Average	$271.00

4. Average Annual Expenditure per Household, per Energy Source

Electricity

Average $380.00

Natural Gas

Average $117.00

Oil

Average $527.00

Gasoline

Average $541.00

Solar

Average 0

5. Use of Various Types of Energy by Purpose

Purpose	Energy type			(% of use)	
	Electricity	Nat gas	Oil	Gasoline	Solar
Space heating	19	17	72	---	1
Water heating	48	14	5	---	---
Battery Warming	15	---	---	---	---
Lighting	100	---	---	---	---
Appliances	70	4	1	4	---
Travel	1	0	4	54	---

D. PERSONAL CHARACTERISTICS OF HOUSEHOLD MEMBERS

1. Age

	%
Less than 20	23
20-29	18
30-49	29
50 and older	31

2. Occupation

	%
Student	24
Homemaker	13
Retired/Unemployed	13
White collar, working class	10
Blue collar, working class	13
Professional/Managerial	26
Self employed/owner	2

3. Education

	%
Elementary	15
Some High School	22
Completed High School	23
Community College	4
Some University	5
University degree	28

4. Total Net Income of Household

Less than 10 000	17
10 000 - 20 000	17
20 000 - 30 000	19
Over 30 000	48

GA:mm-6

A2B089

APPENDIX 3

THE OTTAWA ENERGY BUDGETS GAME

Consisting of:
- Survey form (English and French)
- Player's instructions
- Game card sheets
- Map of Ottawa
- Interviewers' instructions

CITY OF OTTAWA
CITY HALL
111 SUSSEX DRIVE
K1N 5A1
(613) 563-3251

VILLE D'OTTAWA
HOTEL DE VILLE
111, PROMENADE SUSSEX
K1N 5A1
(613) 563-3251

MARION DEWAR
MAYOR MAIRE

February 24, 1983.

Dear Householder:

As energy becomes more expensive, we all find it essential to plan its use in order to preserve our standard of living. The City of Ottawa received a grant from the Ontario Ministries of Energy and of Municipal Affairs and Housing to study the location of facilities with a view to re-grouping them on the basis of greater convenience and future energy considerations. As part of this study, the Community Development Department has to find out how people would plan their trips to various facilities, if there was a shortfall of energy. A number of households have been selected to provide this information, by describing their trips to various facilities and their ideas on how to save energy.

The Department would greatly appreciate receiving your response to the questions in the attached Survey Form. Your family represents many others in the area and your response is therefore crucial for the success of this survey. All the information you provide will be treated in strict confidence. The person who delivered this letter will call to collect it on:

and to invite you to play THE ENERGY BUDGET GAME which is a form of MONOPOLY with MILEAGE used as money. In this game you will be asked to pretend visiting all the facilities you use in the City, but with little or no reliance on the car. A token of appreciation in the form of a City of Ottawa pin will be given to each member of your household at the end of the game.

If you have a query on any question in the Survey Form, please do not hesitate to phone the City Energy Planner, Dr. Gary Armen at 563-3000.

Sincerely,

Marion Dewar

Marion Dewar
Mayor

SURVEY OF TRIPS AND ENERGY USE

Part I: Car Trips (To be filled by all car drivers in the household)

The purpose of this part of the survey is to find the annual number of kilometres run by the car(s) in your household for visiting urban facilities. On the following table, please check (✓) the following:-

i. The FREQUENCY of trips (daily, weekly, monthly, quarterly, or other)

ii. The DISTANCE travelled (one way) in kilometres per trip, remembering that: 1 mile = 1½ kms. (approx.)

If you visit several facilities of the same type - e.g. various restaurants during the month - please indicate an average distance. Each car driver in your household may fill in the lines which apply to his or her movements.

EXAMPLE:

Daycare/Nursery (If you go by car)	✓					2½	CODE 01

DESTINATION	FREQUENCY					DISTANCE (in kms.) 1 mile = 1½ kms. approx.	(For Office Use)
1. EDUCATIONAL FACILITIES	Daily	Weekly	Monthly	Quartly	Other		CODE
Daycare/Nursery							01
Community College							02
University							03
(Other educ'l.)							04
....							05
2. RECREATIONAL FACILITIES							
Sports Arena							06
Bowling Alley							07
Golf Course							08
Sailing Base							09
Swimming Pool							10
Race Track							11
Provincial Park (Gatineau, Algonquin)							12
Botanical Gardens (Experimental Farm)							13
Cottage							14
Canal (for drives)							15
(Other recrn'l.)................							16
....							17

DESTINATION	FREQUENCY					DISTANCE (in kms.) 1 mile = 1½ kms. approx.	(For Office Use)
3. ENTERTAINMENT FACILITIES	Daily	Weekly	Monthly	Quart.ly	Other		CODE
Restaurant(s)							18
Movies							19
Theatre							20
Night Club							21
Bingo Hall							22
(Other entm't.).................							23
....							24
4. CULTURAL FACILITIES							
Library							25
Church							26
Museum							27
Art Gallery							28
Concert Hall							29
Clubs/Societies 1							30
2							31
3							32
4							33
(Other cult'l.).................							34
....							35
5. HEALTH FACILITIES							
Family Doctor							36
Dental Facility							37
Pharmacy							38
Hospital							39
Clinic							40
(Other health).................							41
....							42

DESTINATION	FREQUENCY					DISTANCE (in kms.) 1 mile = 1½ kms. approx.	(For Office Use)
6. SHOPPING FACILITIES	Daily	Weekly	Monthly	Quartly	Other		CODE
Convenience Shops							43
Shopping Centre(s)							44
Bank							45
Market							46
(Other shop'g.)................							47
....							48
7. JOURNEY TO WORK							
Husband							49
Wife							50
Others: 1							51
2							52
3							53
4							54
8. SOCIAL VISITS							
Friends, Relations etc. 1							55
2							56
3							57
4							58
5							59
6							60

9. ROUND TRIPS TO SAVE TIME, EFFORT AND ENERGY

Do you visit some facilities or locations on a 'round trip'? For example:-

DESCRIPTION OF TRIP	ROUND TRIP TO FACILITIES OR LOCATIONS
1. Leaving child at school on your journey to work	Home-School-Work-Home

Please describe your round trips below:-

1.		61
2.		62
3.		63
4.		64
5.		65
6.		66

Part 2: Convenient Pairs of Facilities
(to be filled by all members of the household)

When two or more facilities are located next to each other - a restaurant near a cinema for example - they help us combine two or more purposes in a single trip and save energy as well as enjoy an outing more thoroughly.

1. In the following pairs of facilities, please check ☑ the ones which you would find convenient to use together:-

Pairs based on the Primary School

			CODE
☐ Primary School Convenience Shops	☐ Primary School Play area/Park	☐ Primary School Secondary School	67-9
☐ Primary School Daycare	☐ Primary School Kindergarten	☐ Primary School Clinic	70-2

Pairs based on the Family Doctor

☐ Family Doctor Clinic	☐ Family Doctor Pharmacy	☐ Family Doctor Dental Facility	73-5

Pairs based on the Convenience/Neighbourhood Shops

☐ Convenience Shops Pharmacy	☐ Convenience Shops Clinic	☐ Convenience Shops Wife's workplace	76-8
☐ Convenience Shops Bingo Hall	☐ Convenience Shops Tennis Court	☐ Convenience Shops University	79-81

Pairs based on the Church

☐ Church Community Centre	☐ Church Library	☐ Church Convenience Shops	82-4

Pairs based on the Shopping Centre

☐ Shopping Centre Restaurant	☐ Shopping Centre Movies	☐ Shopping Centre Bank	85-7
☐ Shopping Centre Market	☐ Shopping Centre Pharmacy	☐ Shopping Centre Wife's workplace	88-90
☐ Shopping Centre Museum	☐ Shopping Centre Siblings' Workplace	☐ Shopping Centre Husband's Workplace	91-3

Pairs based on the Restaurant

☐ Restaurant Movies	☐ Restaurant Museum	☐ Restaurant Theatre	94-6
☐ Restaurant Night Club	☐ Restaurant University	☐ Restaurant Bowling Alley	97-9
☐ Restaurant Golf Course	☐ Restaurant Art Gallery	☐ Restaurant Skating (Canal)	100-2
		☐ Restaurant Bingo Hall	103

Pairs based on Workplace

☐ Husband's Workplace Wife's Workplace	☐ Husband's Workplace Bank	☐ Husband's Workplace Restaurant	104-1
☐ Husband's Workplace Siblings' Workplace	☐ Sports Arena Siblings' Workplace	☐ Bowling Alley Siblings' Workplace	107-9

Pairs based on the Park/Play Area

☐ Park/Play Area Tennis Court	☐ Park/Play Area Swimming Pool	☐ Park/Play Area Sports Arena	110-2

Pairs based on the Cottage

☐ Cottage Golf Course	☐ Cottage Sailing Base	☐ Cottage Skiing resort	113-5

Other pairs appearing in more than one preceding Table

☐ Museum Art Gallery	☐ Federal Ministry Provincial Ministry	☐ Regional Government Provincial Ministry	116-8
☐ Sports Arena Tennis Court	☐ Provincial Park Golf Course	☐ Clinic Pharmacy	119-12
☐ Secondary School Library	☐ Community Centre Clubs/Societies	☐ University Daycare	122-4
☐ University Tennis Court	☐ Zoo Provincial Park	☐ Night Club Dancing	125-12

Part 3: ENERGY USE (To be completed by the head of the household)

CODE

The following questions are related to the consumption and cost of energy for various household purposes.

1. What is the approximate total annual kmileage (no. of kms) travelled by the car(s) used by your household? (check) ☑

Less than 5,000 ☐
5,000 - 10,000 ☐
10,001 - 15,000 ☐
15,001 - 20,000 ☐
20,001 - 25,000 ☐
Over 25,000 ☐

128

---

2. Approximately how much is spent per year by your household for the maintenance, insurance and purchase of gasoline to run the cars(s) used?

____________________ 129

3. What is the approximate total annual amount spent by your household for bus or other public transit journeys.

____________________ 130

4. Please complete the following table:

Types of energy used by your household (Check)	Purpose(s)* for which it is used	Approximate annual cost ($) to the household	
1. Electricity			131
2. Nat. gas			132
3. Oil			133
4. Gasoline			134
5. Solar			135

*Please use one or several of the following initials as a code: -

S = Space heating
B = Battery warming
A = Indoor/outdoor appliances
W = Water heating
L = Lighting
T = Travel

5. Please indicate the approximate age, occupation and level of education of each member of your household (no names need be indicated)

Member	Age	Occupation	Education	
1.				136-9
2.				140-3
3.				144-7
4.				148-151
5.				152-5
6.				156-9

6. Which of the following indicates the approximate total net income (i.e. after tax) of all the working members of your household? (check)

☐ Less than $10,000
☐ $10,000-$20,000
☐ $20,000-$30,000
☐ Over $30,000

160

Thank you for your co-operation in this survey.

All information will be treated as confidential.

GA:agb-2
020029

RECORD OF ENERGY BUDGET GAME

ADDRESS: ....

FACILITY VISITED	1982 BUDGETS		1983-85 BUDGETS				1986-88 BUDGETS				1989-92 BUDGETS			
	ANNUAL kms	SALARY GRANTS	-30% kms	SALARY GRANTS	WEATHER OPTIONS	INVENT'S CHANCE	-70% kms	SALARY GRANTS	WEATHER OPTIONS	INVENT'S CHANCE	-100% kms	SALARY GRANTS	WEATHER OPTIONS	INVENT'S CHANCE
TOTALS														

PLEASE COMPLETE & RETURN TO CITY HALL SVP REMPLIR ET RENVOYER À L'HÔTEL DE VILLE

SUGGESTED COMBINATIONS OF FACILITIES FOR ROUND TRIPS

1983-1985 PERIOD

COMBINATION 1

COMBINATION 2

COMBINATION 3

COMBINATION 4

1986-1988 PERIOD

COMBINATION 1

COMBINATION 2

COMBINATION 3

COMBINATION 4

1989-1992 PERIOD

COMBINATION 1

COMBINATION 2

COMBINATION 3

COMBINATION 4

GA:acb-1

PLEASE COMPLETE & RETURN TO CITY HALL

SVP REMPLIR ET RENVOYER À L'HÔTEL DE VILLE

City of
Ville d' **Ottawa**

conservation pipeline

Knowing how our lifestyles may change will help City Council plan for a more convenient city.

Brief were the days of the oil glut bonanza at the gas pump . . . long-term gasoline price projections of the Ontario Ministry of Energy, indicate 240% to 260% increases over current prices by the year 1992.

How will your lifestyle fare with such gasoline price hikes?

To help you visualize the lifestyle change that you may have to introduce to your household to cope with this situation, the Energy Planning Section at City Hall will send you:

The Ottawa Energy Budget Game

in which the players try to recapture all the activities in their lifestyle **DESPITE** reductions in car mileage reflecting foreseeable gasoline price hikes. By the year 1988 you may not only have converted your car to run by propane, you may even have to buy an electric or an hydrogen car.

If you live in Billings, Dalhousie or Capital Ward, your household may be among those selected to take part in this very enjoyable survey. First you will record your trips to various facilities over the past year on a Survey Form. Then you will play the Ottawa Energy Budget Game of combining visits to convenient facilities in **ROUND-TRIP** fashion. The combinations you suggest will help to plan the location of new facilities in the City, so as to increase social convenience and energy conservation in our environment.

YOUR OPINION MATTERS
Tell us how to enrich Ottawa's lifestyle Even through the Energy Tight 1980's

City Council would greatly appreciate your response to this survey. Interested households beyond the selected Wards may also obtain their **FREE** copy of the Ottawa Budget Game by calling

The City Energy Planner
(Gary Armen) at 563-3000

A token of appreciation from the Mayor will be sent for every response.

Help to make Ottawa the Energy-Efficient Capital

THE OTTAWA ENERGY BUDGETS GAME

Objective

- To recapture and improve on the variety of activities in a family's lifestyle, no matter how scarce and expensive gasoline becomes during the 1980's.

Methods - in real life, as well as in the game

- Plan your outings, in order to go to many destinations in round-trip fashion; make all your journeys multi-purpose;
- Change mode of transport, leaving the car at home; go cycling or running or just walking - refuse to stay home and watch television instead of carrying out your normal activities at various urban facilities.
- Convert to propane, buy an electric car, or after 1988, a hydrogen car substituting the need for imported oil with a demand for Canadian or Ontario energy alternatives;
- Improve the energy efficiency of your home making the best of all available grants to save energy and money - for years to come;
- Aim to improve, rather than impoverish the variety of activities in your lifestyle.

Game Instructions

1. After filling in Parts 1, 2 and 3 of the Survey Form, find the annual mileage you need to visit each facility or destination used by your family in 1982, as follows:

   Annual mileage = annual frequency of visits x distance x 2
   e.g. annual mileage to workplace 5 miles away
   = 280 days of work* in the year x 5 x 2 = 2,800 miles

   (*Note: You may assume:-
   280 work days in the year
   220 school days in the year)

2. Locate all your destinations and your home on the map and add up the annual mileage for all of them to find the 1982 Budget of kms or miles.

3. Plan your journey-to-work to earn your salary for any year in the period 1983-1985, by:

   a. Selecting an OPTION FOR TRANSPORTATION by looking at the Options List;

   b. If a car using gasoline was used for any season, pay for the gasoline at the rate shown on Tables 1 and 2;

   c. All other modes of transport - bike, bus, walking, skating earn you rewards, as shown on the Options List;

   d. Combine as many facilities on your trip as possible - e.g., leaving the child at Daycare, buying the newspaper etc. on you way to work, or back home.

4. Earn your salary and add up all salaries earned in your household. Find the Disposable Income according to Table 3. Increase this by 10% for each period of the game - i.e., 1983-85; 1986-88; and 1989-92.

5. Use your Disposable Income for:-

   a. Investment in energy efficiency in your home, taking advantage of Grants. You may also buy INVENTIONS foreseeable for the period.

   b. Convert the heating plant to natural gas or electricity and your car to propane or electricity, or hydrogen (after 1988).

6. Plan your journey to shopping centres, combining shopping and several facilities you visit as part of your lifestyle. Write lists of facilities that make for convenient trips on the Combinations page of the Survey Form.

7. After completing all your journeys make sure that the total mileage by car has not exceeded the allowance for the period, as follows:

   1983-1985: Reduce your 1982 mileage by 30%
   1986-1988: Reduce your 1982 mileage by 70%
   1989-1992: Buy gasoline at the prices shown on Table 1, or obtain a loan to convert to propane, or buy a newly invented vehicle running on hydrogen or electricity. Pay the loan soon after making your journey to work.

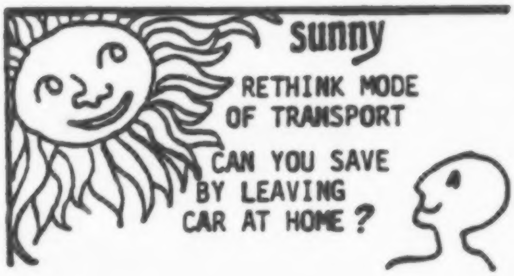
8. Any car mileage left over earns you the privilege of visiting a NEW FACILITY and improving the range of activities in your family's lifestyle. A New Facility may be real or invented - provided you describe the activities you would like to carry out there.

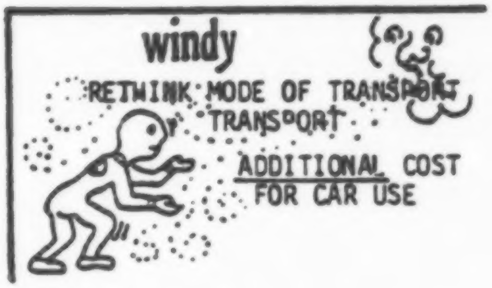
9. Repeat the game for periods 1986-1988 and 1989-1992. If you were able to improve your family's lifestyle - i.e., the range of activities - in all three phases, you have won the Ottawa Energy Budets Game!

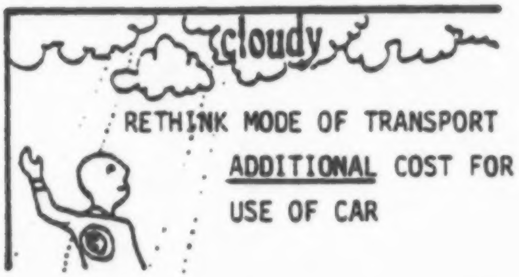
10. For any queries on the game and for passing the benefit of your observations to City Hall, please call:

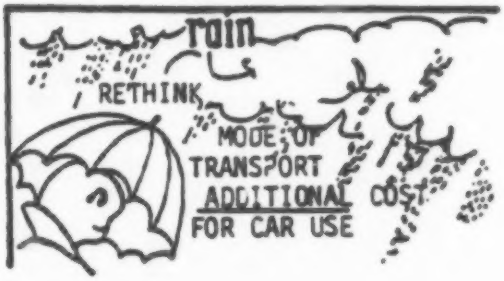
THE CITY ENERGY PLANNER
(Gary Armen) at 563-3000

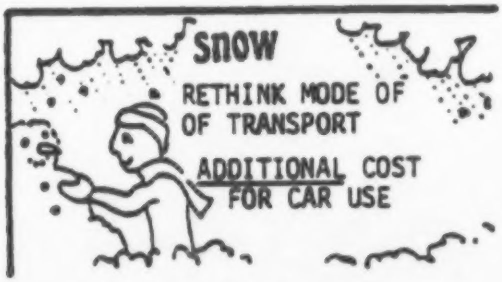
WEATHER FACTOR

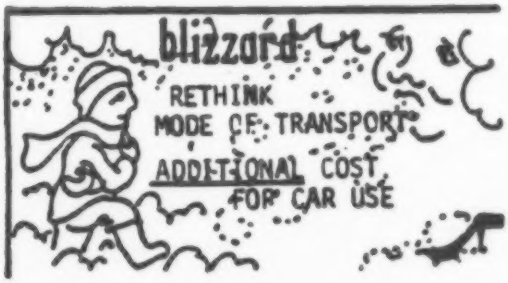

sunny
RETHINK MODE
OF TRANSPORT
CAN YOU SAVE
BY LEAVING
CAR AT HOME ?

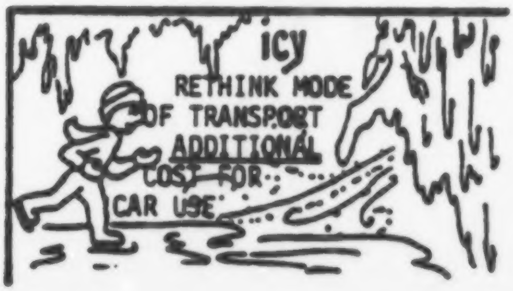

windy
RETHINK MODE OF TRANSPORT
TRANSPORT
ADDITIONAL COST
FOR CAR USE

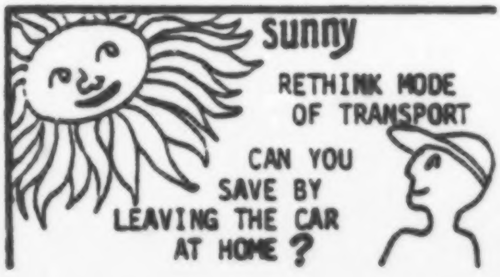

cloudy
RETHINK MODE OF TRANSPORT
ADDITIONAL COST FOR
USE OF CAR


rain
RETHINK
MODE OF
TRANSPORT
ADDITIONAL COST
FOR CAR USE


snow
RETHINK MODE OF
OF TRANSPORT
ADDITIONAL COST
FOR CAR USE


blizzard
RETHINK
MODE OF TRANSPORT
ADDITIONAL COST
FOR CAR USE


icy
RETHINK MODE
OF TRANSPORT
ADDITIONAL
COST FOR
CAR USE


sunny
RETHINK MODE
OF TRANSPORT
CAN YOU
SAVE BY
LEAVING THE CAR
AT HOME ?

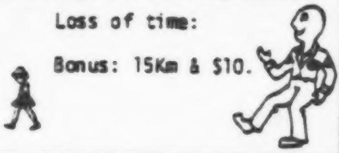
OPTIONS

SHALL USE THE BUS TO THIS DESTINATION
Loss of time:
Occasional waiting
Opportunity to broaden contacts

Bonus: 20Km & $5

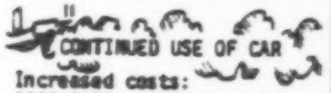
SHALL WALK TO THIS DESTINATION
Loss of time:

Bonus: 15Km & $10.



SHALL GO BY BICYCLE...
- no loss of time
- healthier heart
- time to reflect on things car and gas costs saved

Bonus: 50Km & $25



CONTINUED USE OF CAR
Increased costs:
1983-1985 - 100Km & - $100
1986-1988 - 250Km & - $300
1989-1992 - 500Km & - $500

MAKE MULTI-PURPOSE TRIP
Combining the following:
1.
2.
3.
Bonus for 2 - 25Km & $10
for 3 - 50Km & $30

REDUCED FREQUENCY OF VISITS
From:
To:

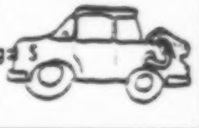
Bonus: 50Km & $25

SHALL CONVERT CAR TO PROPANE

Cost: $3,000

Yearly Savings $

Bonus: 100Km



USE CAR ONLY IN WINTER
* reduce accident risk
* reduce maintenance
* saving in gas

Bonus: 600Km & $1,000

SHALL JOIN A CAR POOL
* gas savings
* good company
* get organized
* some time loss

Bonus: 500Km & $200

SHALL use Motorcycle
no loss of time
risk to life & limb

Gas & maintainence Cost: $75

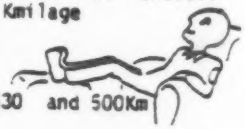
SHALL SKATE TO THIS DESTINATION

* little loss in time
* healthier heart
* time to reflect on things
* car and gas costs saved

Bonus: 50Km & $25

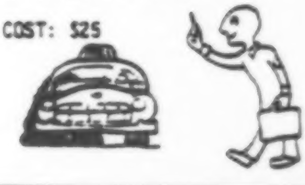
SHALL GIVE UP THIS ACTIVITY
To save Kmilage

BONUS: $30 and 500Km

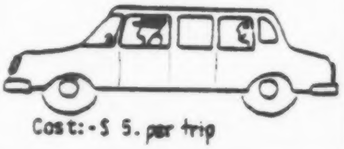


SHALL HIRE A TAXI

COST: $25



SHALL GO BY LIMOUSINE



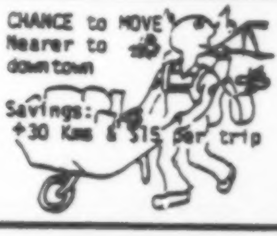
Cost:-$ 5. per trip

NEW JOB
Closer to home

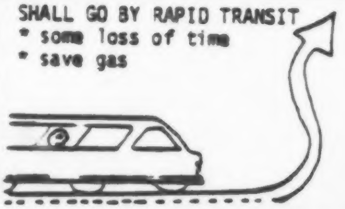
Save: + 30Kms & $15 per trip

CHANCE to MOVE
Nearer to downtown

Savings:
+30 Kms & $15 per trip



SHALL GO BY RAPID TRANSIT
* some loss of time
* save gas

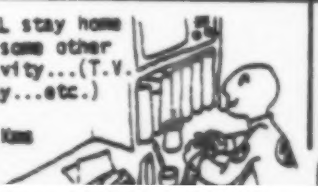


Employer allows me TO WORK AT HOME

Savings:
1 day/week ...$15 & 30Kms
2 day/week ...$30 & 60Kms
3 day/week ...$45 & 90Kms

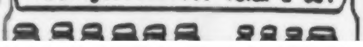
SHALL stay home for some other activity...(T.V. hobby...etc.)

+10 Kms
+$1



SHALL USE TELIDON FOR THIS ACTIVITY (available 1986)

*Shopping........	20Km & $10
*Entertainment...	20Km & $10
*Research........	20Km & $10
*Voting..........	10Km & $5.

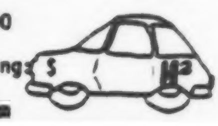


SHALL CONVERT CAR TO HYDROGEN

Cost: $4,000

Yearly Savings $

Bonus: 200Km



INVENTIONS

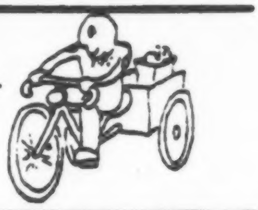
PAY-T.V (1983)

$30 /month

TRICYCLE

Cost:$150.

Annual
Savings:
800 Km



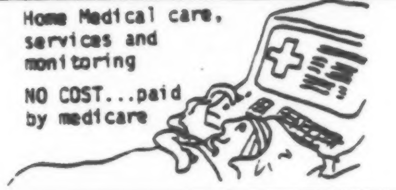
CAULKMOBILE SERVICE
(1983 - 1985)

Cost:$300
Annual Savings: $200

TELIDON (1984)

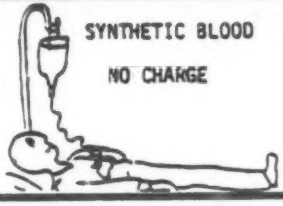
$1200 & 50 Km
COST SAVINGS

Per use: shop, school, work
entertainment, social, research



Home Medical care,
services and
monitoring

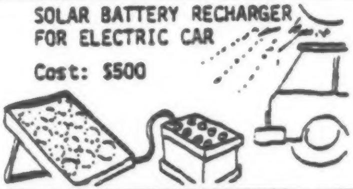
NO COST...paid
by medicare



SYNTHETIC BLOOD

NO CHARGE

AFFORDABLE SOLAR COLLECTOR
Cost: $3,000 (1986)
Annual Savings: $800

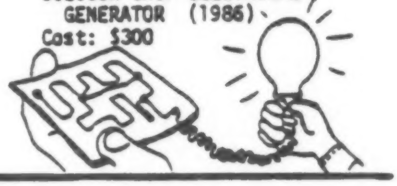


SOLAR BATTERY RECHARGER
FOR ELECTRIC CAR

Cost: $500

CONVERT CAR TO HYDROGEN(1988)

Cost: $3.600
Savings: use ½Km per regular



SILICON CHIP ELECTRICAL
GENERATOR (1986)
Cost: $300

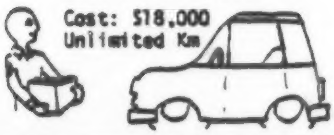
TWO-WAY TERMINALS (1989)

$50 /month

COMPLETE WEIGHT

CONTROL...:
NO COST

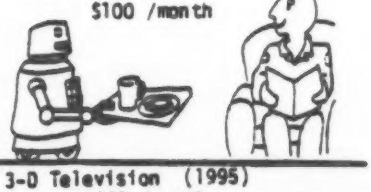
ELECTRIC CAR(1990)

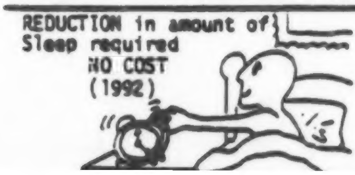


Cost: $18,000
Unlimited Km

MECHANICAL ROBOTS (1991)

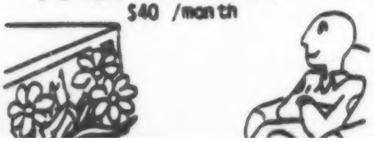
$100 /month



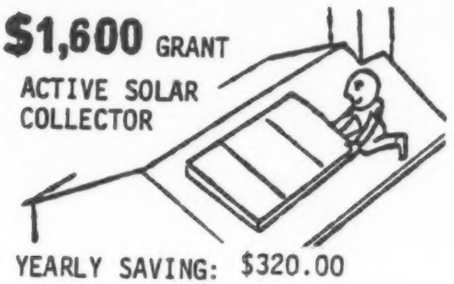


REDUCTION in amount of
Sleep required
NO COST
(1992)

3-D Television (1995)
$40 /month



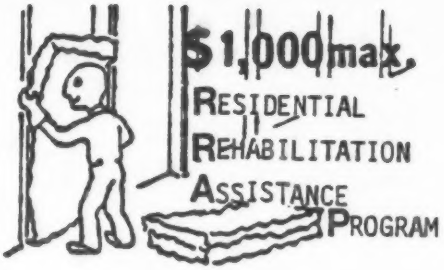
GRANTS



$1,600 GRANT

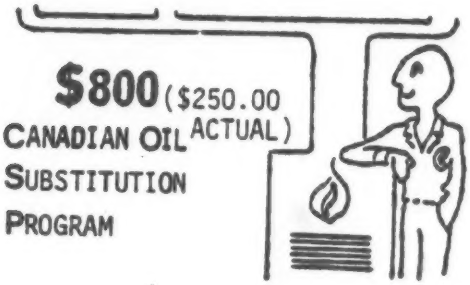
ACTIVE SOLAR COLLECTOR

YEARLY SAVING: $320.00



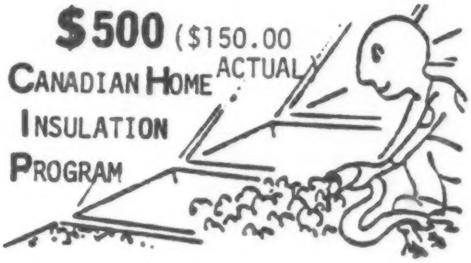
$1,000 max.

RESIDENTIAL REHABILITATION ASSISTANCE PROGRAM



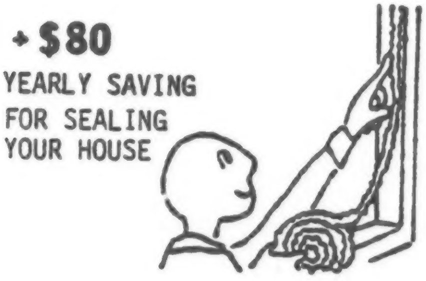
$800 ($250.00 ACTUAL)

CANADIAN OIL SUBSTITUTION PROGRAM



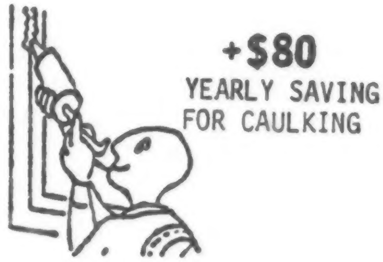
$500 ($150.00 ACTUAL)

CANADIAN HOME INSULATION PROGRAM



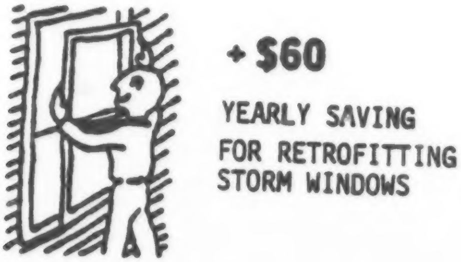
+ $80

YEARLY SAVING FOR SEALING YOUR HOUSE



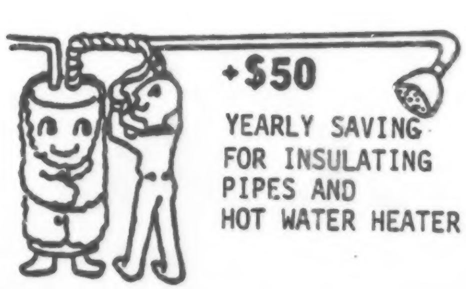
+ $80

YEARLY SAVING FOR CAULKING



+ $60

YEARLY SAVING FOR RETROFITTING STORM WINDOWS

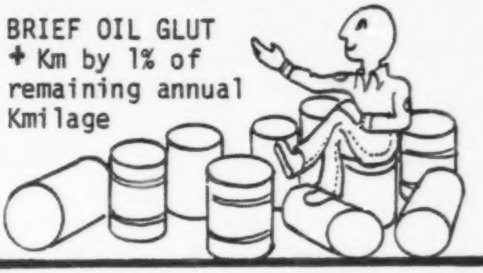


+ $50

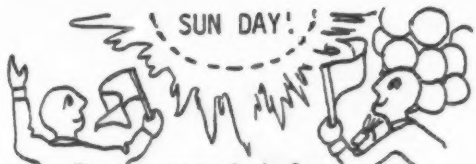
YEARLY SAVING FOR INSULATING PIPES AND HOT WATER HEATER

CHANCE

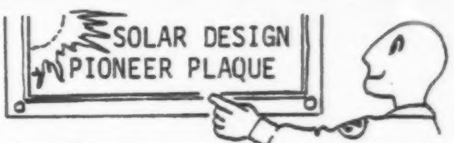
BRIEF OIL
RATIONING
- 1% Km of
remaining
annual
Kmilage



BRIEF OIL GLUT
+ Km by 1% of
remaining annual
Kmilage



Bonus awarded for your
enthusiasm on conservation...
+ $50 & 250 Km's


SOLAR DESIGN
PIONEER PLAQUE

inoffensive home expansion due
to family growth (right to light
...etc.) done..retain card
+ 5% to value of home when sold

ENERGY WEEK

Education & information
Door prize $100 & 110 Km

OTTAWA ENERGY SHOW

Awareness...buy retrofit products
and services...
Cost: $5 Annual Saving: $50

COMPULSORY
INSULATION

Spend $1,000
to bring home
to acceptable
level (borrow
or pay)

CERTIFICATE OF
ENERGY EFFICIENCY 1983-84

Voluntary insulation done...

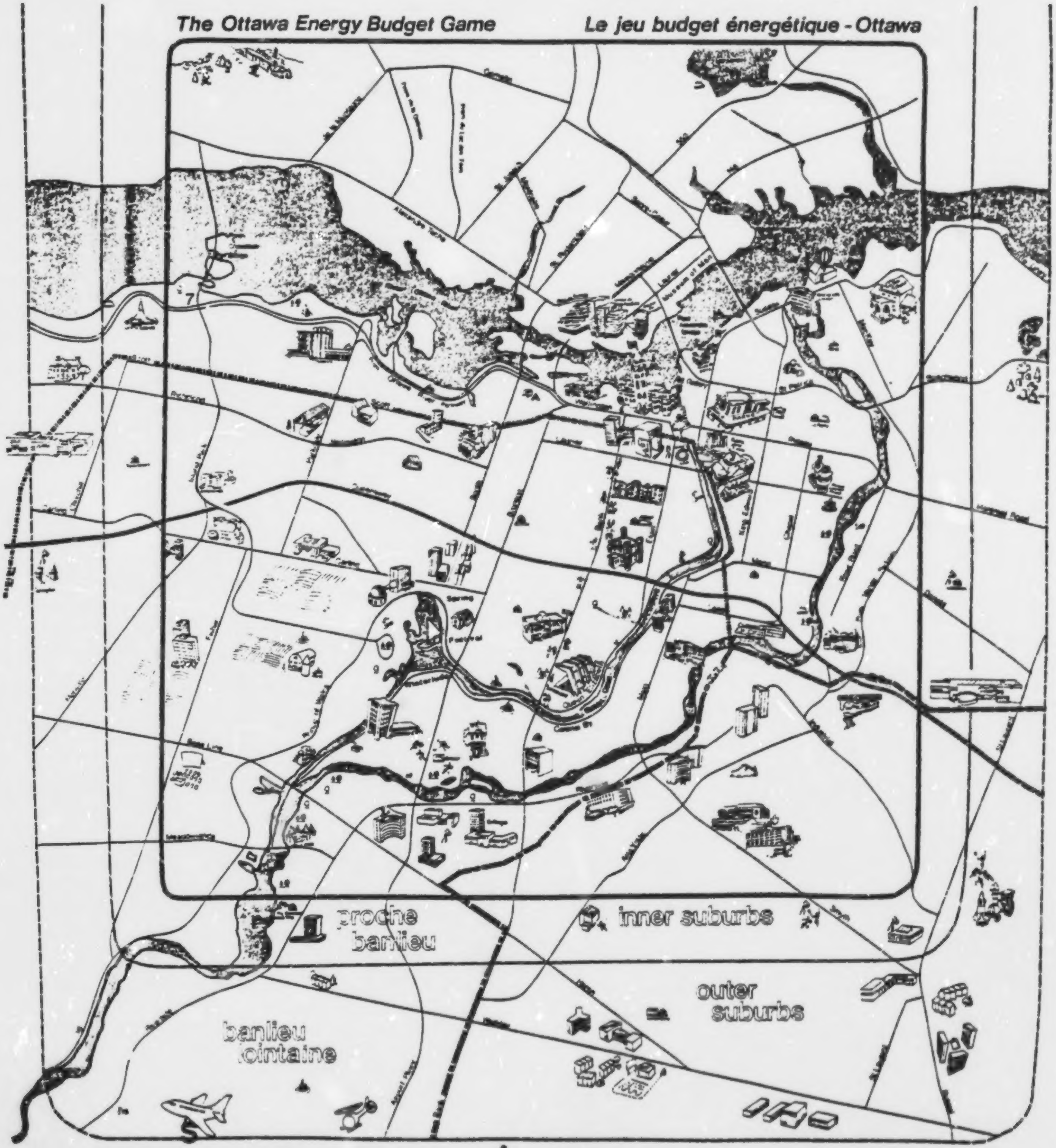
+ 8% to value of home

Home is
ENERGY AUDITED
as part of City's
Energy Action Plan

Bonus: + $30

SOLAR ACCESS
TO HOME
PROTECTED
Install larger
south windows
Cost: $300
Annual Saving: $200

Map of the City of Ottawa
(showing projected features, which in accordance with the Symposium, are planned for the decade 1982-1992. This map served as the baseboard for the Ottawa Energy Budgets Game


The Ottawa Energy Budget Game
Le jeu budget énergétique - Ottawa
proche banlieu
inner suburbs
outer suburbs
banlieu lointaine

REDUCED TO 1/4 FULL SIZE

CITY OF OTTAWA
CITY HALL
111 SUSSEX DRIVE
K1N 5A1
(613) 563-3251

VILLE D'OTTAWA
HOTEL DE VILLE
111, PROMENADE SUSSEX
K1N 5A1
(613) 563-3251

MARION DEWAR
MAYOR MAIRE

le 24 février 1983

Au résident,

Plus les coûts de l'énergie augmentent, plus nous sentons le besoin d'en planifier l'utilisation pour maintenir notre qualité de vie. Grâce à une subvention des ministères provinciaux de l'Énergie et des Affaires municipales et du logement, la Ville d'Ottawa effectuera une étude dans le but de regrouper les installations en vue d'en faciliter l'accès et pour tenir compte de l'éventuelle situation énergétique. Dans le cadre de cette étude, le Service du développement communautaire aimerait connaître la façon dont les ménages planifieraient leurs déplacements advenant une pénurie d'énergie. Il a choisi un certain nombre de ménages qui lui fourniront ces renseignements en faisant la description de leurs déplacements et en donnant des idées sur les façons d'économiser l'énergie.

Vous aiderez le service en remplissant le questionnaire ci-joint. Votre famille est représentative de bien d'autres familles du secteur, alors votre participation est essentielle au succès de ce sondage. Tous les renseignements que vous fournirez seront utilisés avec la plus stricte discrétion. La personne qui vous remettra la présente lettre passera prendre le questionnaire le ______________ et vous invitera à jouer au "BUDGET ÉNERGÉTIQUE", un jeu analogue au "monopolie", sauf que l'argent est remplacé par le kilométrage. Dans le cadre de ce jeu, vous devrez faire vos déplacements à l'intérieur d'Ottawa sans utiliser l'automobile. À la fin du jeu, chaque membre de votre ménage recevra une épingle de la Ville d'Ottawa en reconnaissance de sa participation.

Si vous désirez des précisions sur l'une des questions du questionnaire, n'hésitez pas à communiquer avec l'urbaniste chargé de la politique énergétique, Gary Armén (563-3000).

le Maire

Marion Dewar
Marion Dewar

SONDAGE SUR LES DÉPLACEMENTS ET L'UTILISATION DE L'ÉNERGIE

Partie I: Déplacements en véhicule automobile (à remplir par chaque automobiliste du ménage)

Le but de cette partie du présent sondage est d'obtenir le nombre annuel de kilomètres parcourus par le(les) véhicule(s) de votre ménage pour vous rendre à des installations urbaines. Veuillez indiquer vos réponses en cochant dans les tableaux suivants:

(i) La FRÉQUENCE des déplacements (quotidiens, hebdomadaires, mensuels, trimestriels ou autre)

(ii) La DISTANCE parcourue (dans un sens) en kilomètres par déplacement. Notez: 1 mille = 1½ kilomètre (environ).

Si vous allez à plusieurs destinations du même genre (par exemple des restaurants différents au cours du mois) indiquez une distance en moyenne. Chacun des membres de votre famille peut répondre sur les lignes qui s'appliquent à ses déplacements.

EXEMPLE:

Garderie (Si vous utilisez la voiture)	✓					2½	CODE 01

DESTINATION	FRÉQUENCE					DISTANCE (km)	(À l'usage du bureau)
1. ÉTABLISSEMENT D'INSTRUCTION	QUOTIDIENS	HEBDOMAD'S	MENSUELS	TRIMESTR'S	AUTRES		CODE
Garderie/pouponnière							01
Collège communautaire							02
Université							03
(Autres)..........							04
....							05
2. INSTALLATIONS RÉCRÉATIVES							
Complexe sportif							06
Salle de quilles							07
Club de golf							08
Club nautique							09
Piscine							10
Champ de course							11
Parc provincial (Gatineau, Algonquin)							12
Jardins botaniques (Ferme expérimentale)							13
Chalet							14
Canal (randonnées en voiture)							15
(Autres)							16
....							17

3. LIEUX DE DIVERTISSEMENT	QUOTIDIENS	HEBDOMAD'S	MENSUELS	TRIMESTR'S	AUTRES		
Restaurant(s)							18
Cinéma							19
Théâtre							20
Boîte de nuit							21
Salle de bingo							22
(Autres).........							23
....							24
4. INSTALLATIONS CULTURELLES							
Bibliothèque							25
Église							26
Musée							27
Galerie d'art							28
Salle de concert							29
Clubs/sociétés 1							30
2							31
3							32
4							33
(Autres)							34
....							35
5. INSTALLATIONS DE SANTÉ/MÉDICALES							
Médecin de famille							36
Dentiste							37
Pharmacie							38
Hôpital							39
Clinique							40
(Autres)							41
....							42

6. INSTALLATIONS COMMERCIALES	QUOTIDIENS	HEBDOMAD'S	MENSUELS	TRIMESTR'S	AUTRES		
Dépanneur							43
Centre commercial							44
Banque							45
Marché							46
(Autres)							47
....							48

7. DÉPLACEMENT
POUR LE TRAVAIL

Mari								49
Femme								50
Autres:	1							51
	2							52
	3							53
	4							54

8. VISITES

Amis, parents, etc.	1							56
	2							56
	3							57
	4							58
	5							59
	6							60

9. Déplacement aller et retour en vue de gagner du temps et d'épargner des efforts et de l'énergie

Y a-t-il des déplacements qui vous amènent par plusieurs destinations ou installations avant de rentrer à la maison? Par exemple:

DESCRIPTION DU DÉPLACEMENT	DÉPLACEMENT AUX INSTALLATIONS/ DESTINATIONS
1. Laisser un enfant à l'école en vous rendant au travail	Maison-école-travail-maison

Décrivez ci-dessous vos déplacements aller et retour:

1.		61
2.		62
3.		63
4.		64
5.		65
6.		66

Partie 2: Installations regroupées par deux
(à remplir par tous les membres de la famille)

Lorsque deux ou plusieurs installations sont rapprochés, par exemple un restaurant tout près d'un cinéma, nous pouvons combiner deux ou trois motifs pour un déplacement et, par conséquent, économiser de l'énergie tout en profitant davantage du déplacement.

1. Veuillez cocher les installations que vous utiliseriez ensemble si elles étaient regroupées:

			CODE
À partir de l'école primaire			
☐ École primaire Dépanneurs	☐ École primaire Terrain de jeux/ parc	☐ École primaire École sondaire	67-9
☐ École primaire Garderie	☐ École primaire Maternelle	☐ École primaire Clinique	70-2
À partir du médecin de famille			
☐ Médecin de famille Clinique	☐ Médecin de famille Pharmacie	☐ Médecin de famille Dentiste	73-5
À partir des dépanneurs ou des magasins du quartier			
☐ Dépanneur Pharmacie	☐ Dépanneur Clinique	☐ Dépanneur Lieu de travail de la femme	76-8
☐ Dépanneur Salle de bingo	☐ Dépanneur Court de tennis	☐ Dépanneur Université	79-81
À partir de l'église			
☐ Église Centre communautaire	☐ Église Bibliothèque	☐ Église Dépanneur	82-4
À partir du centre commercial			
☐ Centre commercial Restaurant	☐ Centre commercial Cinéma	☐ Centre commercial Banque	85-87
☐ Centre commercial Marché	☐ Centre commercial Pharmacie	☐ Centre commercial Lieu de travail de la femme	88-90
☐ Centre commercial Musée	☐ Centre commercial Lieu de travail d'un autre membre de la famille	☐ Centre commercial Lieu de travail du mari	91-3

À partir du restaurant

☐ Restaurant Cinéma	☐ Restaurant Musée	☐ Restaurant Théâtre	94-96
☐ Restaurant Boîte de nuit	☐ Restaurant Université	☐ Restaurant Salle de quilles	97-9
☐ Restaurant Club de golf	☐ Restaurant Galerie d'art	☐ Restaurant Patinage (Canal)	100-2
		☐ Restaurant Salle de bingo	103

À partir du lieu de travail

☐ Lieu de travail du mari Lieu de travail de la femme	☐ Lieu de travail du mari Banque	☐ Lieu de travail du mari Restaurant	104-106
☐ Lieu de travail du mari Lieu de travail d'un autre membre de la famille	☐ Complexe sportif Lieu de travail d'un autre membre de la famille	☐ Salle de quille Lieu de travail d'un autre membre de la famille	107-9

À partir d'un parc/terrain de jeu

☐ Parc/terrain de jeu Court de tennis	☐ Parc/terrain de jeu Piscine	☐ Parc/terrain de jeu Complexe sportif	110-2

À partir du chalet

☐ Chalet Club de golf	☐ Chalet Club nautique	☐ Chalet Station de ski	113-5

Autres possibilités de regroupement d'installations

☐ Musée Galerie d'art	☐ Ministère fédéral Ministère provincial	☐ Gouvernement régional Ministère provincial	116-8
☐ Complext sportif Court de tennis	☐ Parc provincial Club de golf	☐ Clinique Pharmacie	119-121
☐ École secondaire Bibliothèque	☐ Centres communautaires Clubs/sociétés	☐ Université Garderie	122-4
☐ Université Court de tennis	☐ Jardin zoologique Parc provincial	☐ Boîte de nuit Salle de danse	125-127

Partie 3: UTILISATION DE L'ÉNERGIE
(À remplir par le chef de la famille)

Les questions suivantes portent sur la consommation et sur le coût de l'énergie à diverses fins dans la maison.

1. Quel est le nombre approximatif de kilomètres parcourus par le(s) véhicule(s) automobile(s) en une année? (cochez)

Moins de 5 000 ☐
5 000 - 10 000 ☐
10 001 - 15 000 ☐
15 001 - 20 000 ☐
20 001 - 25 000 ☐
Plus de 25 000 ☐

128

2. Combien vous coûte approximativement chaque année votre (vos) véhicule(s) automobile(s) pour l'entretien, l'assurance et l'essence?

________________________ 129

3. Quel est, à peu près, le montant total dépensé par votre famille pour les déplacements en autobus ou autres moyens de transport en commun?

________________________ 130

4. Veuillez remplir le tableau suivant:

Sources d'énergie utilisées dans votre maison (cochez)	Utilisations *	Coût annuel approximatif en dollars	
1. Électricité			131
2. Gaz			132
3. Mazout			133
4. Essence			134
5. Énergie solaire			135

* Prière d'utiliser l'un des codes suivants:

M - Chauffage de la maison
B - Réchauffage de la batterie
E - Chauffage de l'eau
É - Éclairage
A - Appareils intérieurs/extérieurs
V - Voyage

5. Prière d'indiquer l'âge approximatif, les occupations, et le degré de scolarité de chacun des membres de votre famille (inutile de donner le nom)

Membre	Âge	Occupation	Scolarité	
1.				136-9
2.				140-3
3.				144-7
4.				148-151
5.				152-5
6.				156-9

6. Quel est le revenu total net (après retenu des impôts) de tous les membres de votre famille? (Cochez)

☐ Moins de 10 000 $
☐ 10 000 $ à 20 000 $
☐ 20 000 $ à 30 000 $
☐ Plus de 30 000 $

160

Nous vous remercions de votre collaboration et vous prions de croire que tous les renseignements seront considérés comme confidentiels.

GA:jd

C2K208

RELEVÉ DU JEU SUR LES BUDGETS ÉNERGÉTIQUES

ADRESSE:

INSTALLATION VISITÉE	BUDGET 1982		BUDGET 1983-1985				BUDGET 1986-1988				BUDGET 1989-1992			
	km ANNUELS	SUBVENTIONS SALAIRE	-30% km	SALAIRE SUBVENTIONS	OPTIONS MÉTÉO	INVENTIONS CHANCES	-70% km	SALAIRE SUBVENTIONS	OPTIONS MÉTÉO	INVENTIONS CHANCES	-100% km	SALAIRE SUBVENTIONS	OPTIONS MÉTÉO	INVENTIONS CHANCES
TOTAUX														

COMBINAISONS SUGGÉRÉES
POUR LES DÉPLACEMENTS À DESTINATIONS MULTIPLES

PÉRIODE 1983-1985

COMBINAISON 1
COMBINAISON 2

COMBINAISON 3
COMBANAISON 4

PÉRIODE 1986-1988

COMBINAISON 1
COMBINAISON 2

COMBINAISON 3
COMBINAISON 4

PÉRIODE 1989-1992

COMBINAISON 1
COMBINAISON 2

COMBINAISON 3
COMBINAISON 4

pleins feux sur l'énergie

En sachant comment nos modes de vie changeront, le Conseil municipal pourra aménager une ville plus pratique.

Les beaux jours de l'essence à prix modique n'ont pas duré très longtemps. Le ministère de l'Energie de l'Ontario prévoit qu'à long terme, c'est-à-dire d'ici l'an 1992, le prix de l'essence augmentera de 240% à 260%.

Quelles répercussions aura cette augmentation de prix sur votre mode de vie?

Pour vous aider à vous représenter les changements de mode de vie que vous devrez peut-être adopter pour faire face à cette situation, la Section des plans d'énergie de l'Hôtel de ville vous a fait parvenir:

Le jeu des budgets énergétiques d'Ottawa

Dans lequel les joueurs essaient de reprendre toutes les activités de leur mode de vie ***en dépit*** de la réduction de kilométrage reflétant les hausses prévues du prix de l'essence. D'ici l'an 1988, il se peut que vous ayez non seulement fait adapter votre auto au propane mais vous serez peut-être même obligé d'acheter un véhicule électrique ou alimenté à l'hydrogène...

Si vous habitez dans le quartier Billings, Dalhousie ou Capital, votre famille peut figurer au nombre des gens choisis par le Conseil municipal pour participer à ce sondage très amusant. D'abord, vous inscrirez vos déplacements vers diverses installations au cours de la dernière année sur une formule de sondage. Ensuite, vous jouerez le Jeu des budgets énergétiques d'Ottawa en combinant des ***visites*** à diverses installations en un ***même déplacement.*** Les combinaisons que vous suggérerez aideront à décider de l'emplacement des nouvelles installations dans la ville afin d'augmenter la commodité et la conservation de l'énergie dans notre entourage.

Votre opinion compte
Dites-nous comment enrichir le mode de vie des gens d'Ottawa
— malgré la pénurie d'énergie des années 1980

Le Conseil municipal apprécierait beaucoup que vous répondiez à ce sondage. Les familles intéressées, qui habitent à l'extérieur des quartiers choisis, peuvent obtenir leur exemplaire ***gratuit*** du Jeu des budgets énergétiques d'Ottawa en téléphonant au

Responsable des plans d'énergie de la ville
(Gary Armen) au 563-3000

Le maire enverra à chaque participant un gage de sa reconnaissance.

Aidez à faire d'Ottawa une capitale
où l'énergie est consommée efficacement.

CITY OF OTTAWA
CITY HALL
III SUSSEX DRIVE
K1N 5A1
(613) 563-3251

VILLE D'OTTAWA
HOTEL DE VILLE
III, PROMENADE SUSSEX
K1N 5A1
(613) 563-3251

MARION DEWAR
MAYOR MAIRE

le 24 février 1983

Au résident,

Plus les coûts de l'énergie augmentent, plus nous sentons le besoin d'en planifier l'utilisation pour maintenir notre qualité de vie. Grâce à une subvention des ministères provinciaux de l'Énergie et des Affaires municipales et du logement, la Ville d'Ottawa effectuera une étude dans le but de regrouper les installations en vue d'en faciliter l'accès et pour tenir compte de l'éventuelle situation énergétique. Dans le cadre de cette étude, le Service du développement communautaire aimerait connaître la façon dont les ménages planifieraient leurs déplacements advenant une pénurie d'énergie. Il a choisi un certain nombre de ménages qui lui fourniront ces renseignements en faisant la description de leurs déplacements et en donnant des idées sur les façons d'économiser l'énergie.

Vous aiderez le service en remplissant le questionnaire ci-joint. Votre famille est représentative de bien d'autres familles du secteur, alors votre participation est essentielle au succès de ce sondage. Tous les renseignements que vous fournirez seront utilisés avec la plus stricte discrétion. La personne qui vous remettra la présente lettre passera prendre le questionnaire le ______________ et vous invitera à jouer au "BUDGET ÉNERGÉTIQUE", un jeu analogue au "monopolie", sauf que l'argent est remplacé par le kilométrage. Dans le cadre de ce jeu, vous devrez faire vos déplacements à l'intérieur d'Ottawa sans utiliser l'automobile. À la fin du jeu, chaque membre de votre ménage recevra une épingle de la Ville d'Ottawa en reconnaissance de sa participation.

Si vous désirez des précisions sur l'une des questions du questionnaire, n'hésitez pas à communiquer avec l'urbaniste chargé de la politique énergétique, Gary Armén (563-3000).

le Maire

Marion Dewar
Marion Dewar

SONDAGE SUR LES DÉPLACEMENTS ET L'UTILISATION DE L'ÉNERGIE

Partie I: Déplacements en véhicule automobile (à remplir par chaque automobiliste du ménage)

Le but de cette partie du présent sondage est d'obtenir le nombre annuel de kilomètres parcourus par le(les) véhicule(s) de votre ménage pour vous rendre à des installations urbaines. Veuillez indiquer vos réponses en cochant dans les tableaux suivants:

(i) La FRÉQUENCE des déplacements (quotidiens, hebdomadaires, mensuels, trimestriels ou autre)

(ii) La DISTANCE parcourue (dans un sens) en kilomètres par déplacement. Notez: 1 mille = 1½ kilomètre (environ).

Si vous allez à plusieurs destinations du même genre (par exemple des restaurants différents au cours du mois) indiquez une distance en moyenne. Chacun des membres de votre famille peut répondre sur les lignes qui s'appliquent à ses déplacements.

EXEMPLE:

Garderie (Si vous utilisez la voiture)	✓					2½	CODE 01

DESTINATION	FRÉQUENCE					DISTANCE (km)	(À l'usage du bureau)
	QUOTIDIENS	HEBDOMAD'S	MENSUELS	TRIMESTR'S	AUTRES		CODE
1. ÉTABLISSEMENT D'INSTRUCTION							
Garderie/pouponnière							01
Collège communautaire							02
Université							03
(Autres)..........							04
....							05
2. INSTALLATIONS RÉCRÉATIVES							
Complexe sportif							06
Salle de quilles							07
Club de golf							08
Club nautique							09
Piscine							10
Champ de course							11
Parc provincial (Gatineau, Algonquin)							12
Jardins botaniques (Ferme expérimentale)							13
Chalet							14
Canal (randonnées en voiture)							15
(Autres)							16
....							17

3. LIEUX DE DIVERTISSEMENT	QUOTIDIENS	HEBDOMAD'S	MENSUELS	TRIMESTR'S	AUTRES		
Restaurant(s)							18
Cinéma							19
Théâtre							20
Boîte de nuit							21
Salle de bingo							22
(Autres).........							23
....							24

4. INSTALLATIONS CULTURELLES

Bibliothèque							25
Église							26
Musée							27
Galerie d'art							28
Salle de concert							29
Clubs/sociétés 1							30
2							31
3							32
4							33
(Autres)							34
....							35

5. INSTALLATIONS DE SANTÉ/MÉDICALES

Médecin de famille							36
Dentiste							37
Pharmacie							38
Hôpital							39
Clinique							40
(Autres)							41
....							42

6. INSTALLATIONS COMMERCIALES	QUOTIDIENS	HEBDOMAD'S	MENSUELS	TRIMESTR'S	AUTRES		
Dépanneur							43
Centre commercial							44
Banque							45
Marché							46
(Autres)							47
....							48

7. DÉPLACEMENT POUR LE TRAVAIL

Mari								49
Femme								50
Autres:	1							51
	2							52
	3							53
	4							54

8. VISITES

Amis, parents, etc.	1							56
	2							56
	3							57
	4							58
	5							59
	6							60

9. Déplacement aller et retour en vue de gagner du temps et d'épargner des efforts et de l'énergie

Y a-t-il des déplacements qui vous amènent par plusieurs destinations ou installations avant de rentrer à la maison? Par exemple:

DESCRIPTION DU DÉPLACEMENT	DÉPLACEMENT AUX INSTALLATIONS/ DESTINATIONS
1. Laisser un enfant à l'école en vous rendant au travail	Maison-école-travail-maison

Décrivez ci-dessous vos déplacements aller et retour:

1.		61
2.		62
3.		63
4.		64
5.		65
6.		66

Partie 2: Installations regroupées par deux
(à remplir par tous les membres de la famille)

Lorsque deux ou plusieurs installations sont rapprochés, par exemple un restaurant tout près d'un cinéma, nous pouvons combiner deux ou trois motifs pour un déplacement et, par conséquent, économiser de l'énergie tout en profitant davantage du déplacement.

1. Veuillez cocher les installations que vous utiliseriez ensemble si elles étaient regroupées:

			CODE
À partir de l'école primaire			
☐ École primaire Dépanneurs	☐ École primaire Terrain de jeux/ parc	☐ École primaire École sondaire	67-9
☐ École primaire Garderie	☐ École primaire Maternelle	☐ École primaire Clinique	70-2
À partir du médecin de famille			
☐ Médecin de famille Clinique	☐ Médecin de famille Pharmacie	☐ Médecin de famille Dentiste	73-5
À partir des dépanneurs ou des magasins du quartier			
☐ Dépanneur Pharmacie	☐ Dépanneur Clinique	☐ Dépanneur Lieu de travail de la femme	76-8
☐ Dépanneur Salle de bingo	☐ Dépanneur Court de tennis	☐ Dépanneur Université	79-81
À partir de l'église			
☐ Église Centre communautaire	☐ Église Bibliothèque	☐ Église Dépanneur	82-4
À partir du centre commercial			
☐ Centre commercial Restaurant	☐ Centre commercial Cinéma	☐ Centre commercial Banque	85-87
☐ Centre commercial Marché	☐ Centre commercial Pharmacie	☐ Centre commercial Lieu de travail de la femme	88-90
☐ Centre commercial Musée	☐ Centre commercial Lieu de travail d'un autre membre de la famille	☐ Centre commercial Lieu de travail du mari	91-3

À partir du restaurant

☐ Restaurant Cinéma	☐ Restaurant Musée	☐ Restaurant Théâtre	94-96
☐ Restaurant Boîte de nuit	☐ Restaurant Université	☐ Restaurant Salle de quilles	97-9
☐ Restaurant Club de golf	☐ Restaurant Galerie d'art	☐ Restaurant Patinage (Canal)	100-2
		☐ Restaurant Salle de bingo	103

À partir du lieu de travail

☐ Lieu de travail du mari Lieu de travail de la femme	☐ Lieu de travail du mari Banque	☐ Lieu de travail du mari Restaurant	104-106
☐ Lieu de travail du mari Lieu de travail d'un autre membre de la famille	☐ Complexe sportif Lieu de travail d'un autre membre de la famille	☐ Salle de quille Lieu de travail d'un autre membre de la famille	107-9

À partir d'un parc/terrain de jeu

☐ Parc/terrain de jeu Court de tennis	☐ Parc/terrain de jeu Piscine	☐ Parc/terrain de jeu Complexe sportif	110-2

À partir du chalet

☐ Chalet Club de golf	☐ Chalet Club nautique	☐ Chalet Station de ski	113-5

Autres possibilités de regroupement d'installations

☐ Musée Galerie d'art	☐ Ministère fédéral Ministère provincial	☐ Gouvernement régional Ministère provincial	116-8
☐ Complext sportif Court de tennis	☐ Parc provincial Club de golf	☐ Clinique Pharmacie	119-121
☐ École secondaire Bibliothèque	☐ Centres communautaires Clubs/sociétés	☐ Université Garderie	122-4
☐ Université Court de tennis	☐ Jardin zoologique Parc provincial	☐ Boîte de nuit Salle de danse	125-127

Partie 3: UTILISATION DE L'ÉNERGIE
(À remplir par le chef de la famille)

Les questions suivantes portent sur la consommation et sur le coût de l'énergie à diverses fins dans la maison.

1. Quel est le nombre approximatif de kilomètres parcourus par le(s) véhicule(s) automobile(s) en une année? (cochez)

Moins de 5 000 ☐
5 000 - 10 000 ☐
10 001 - 15 000 ☐
15 001 - 20 000 ☐
20 001 - 25 000 ☐
Plus de 25 000 ☐

128

2. Combien vous coûte approximativement chaque année votre (vos) véhicule(s) automobile(s) pour l'entretien, l'assurance et l'essence?

______________________ 129

3. Quel est, à peu près, le montant total dépensé par votre famille pour les déplacements en autobus ou autres moyens de transport en commun?

______________________ 130

4. Veuillez remplir le tableau suivant:

Sources d'énergie utilisées dans votre maison (cochez)	Utilisations *	Coût annuel approximatif en dollars	
1. Électricité			131
2. Gaz			132
3. Mazout			133
4. Essence			134
5. Énergie solaire			135

* Prière d'utiliser l'un des codes suivants:

M - Chauffage de la maison
É - Éclairage
B - Réchauffage de la batterie
A - Appareils intérieurs/extérieurs
E - Chauffage de l'eau
V - Voyage

5. Prière d'indiquer l'âge approximatif, les occupations, et le degré de scolarité de chacun des membres de votre famille (inutile de donner le nom)

Membre	Âge	Occupation	Scolarité	
1.				136-9
2.				140-3
3.				144-7
4.				148-151
5.				152-5
6.				156-9

6. Quel est le revenu total net (après retenu des impôts) de tous les membres de votre famille? (Cochez)

☐ Moins de 10 000 $ ☐ 10 000 $ à 20 000 $	☐ 20 000 $ à 30 000 $ ☐ Plus de 30 000 $	160

Nous vous remercions de votre collaboration et vous prions de croire que tous les renseignements seront considérés comme confidentiels.

GA:jd

C2K208

RELEVÉ DU JEU SUR LES BUDGETS ÉNERGÉTIQUES

ADRESSE:

	BUDGET 1982		BUDGET 1983-1985				BUDGET 1986-1988				BUDGET 1989-1992			
INSTALLATION VISITÉE	km ANNUELS	SUBVENTIONS SALAIRE	-30% km	SALAIRE SUBVENTIONS	OPTIONS MÉTÉO	INVENTIONS CHANCES	-70% km	SALAIRE SUBVENTIONS	OPTIONS MÉTÉO	INVENTIONS CHANCES	-100% km	SALAIRE SUBVENTIONS	OPTIONS MÉTÉO	INVENTIONS CHANCES
TOTAUX														

COMBINAISONS SUGGÉRÉES
POUR LES DÉPLACEMENTS À DESTINATIONS MULTIPLES

PÉRIODE 1983-1985

COMBINAISON 1

COMBINAISON 2

COMBINAISON 3

COMBANAISON 4

PÉRIODE 1986-1988

COMBINAISON 1

COMBINAISON 2

COMBINAISON 3

COMBINAISON 4

PÉRIODE 1989-1992

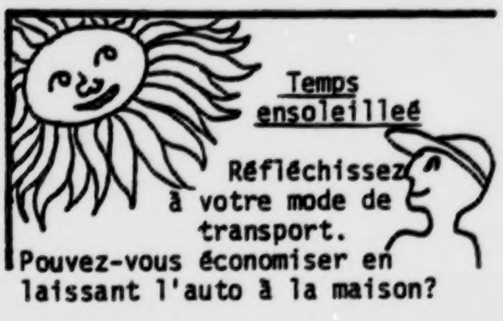
COMBINAISON 1

COMBINAISON 2

COMBINAISON 3

COMBINAISON 4

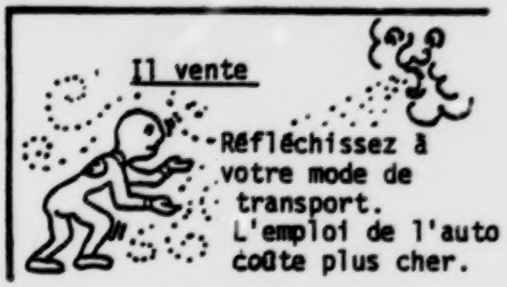
FACTEUR
METÉOROLOGIQUE



Temps ensoleilleé

Réfléchissez à votre mode de transport.

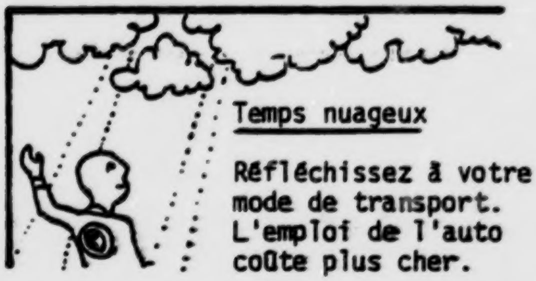
Pouvez-vous économiser en laissant l'auto à la maison?



Il vente

Réfléchissez à votre mode de transport.

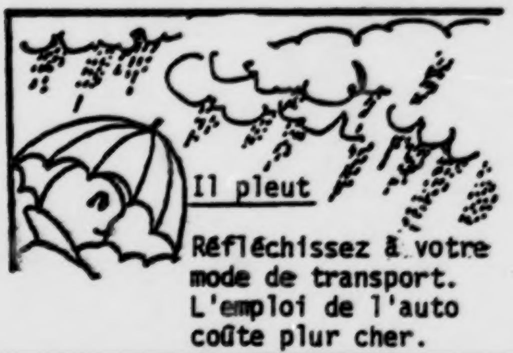
L'emploi de l'auto coûte plus cher.



Temps nuageux

Réfléchissez à votre mode de transport.

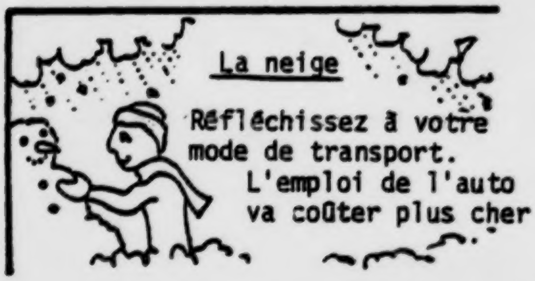
L'emploi de l'auto coûte plus cher.



Il pleut

Réfléchissez à votre mode de transport.

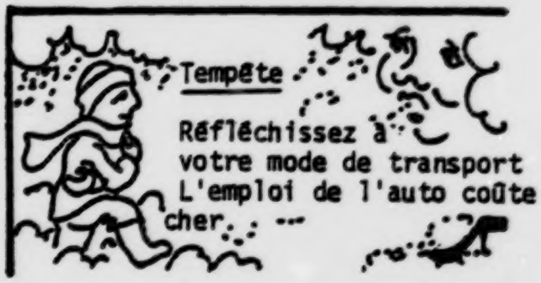
L'emploi de l'auto coûte plur cher.



La neige

Réfléchissez à votre mode de transport.

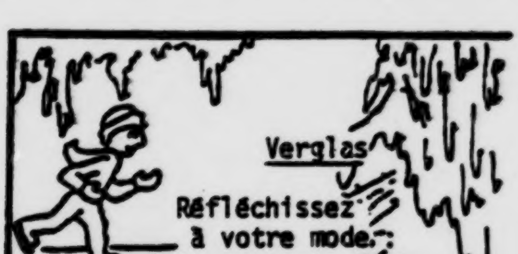
L'emploi de l'auto va coûter plus cher



Tempête

Réfléchissez à votre mode de transport

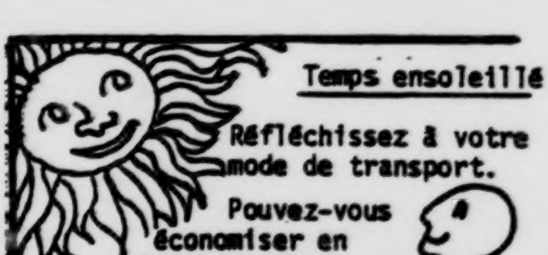
L'emploi de l'auto coûte cher.



Verglas

Réfléchissez à votre mode de transport.

L'emploi de l'auto coûte plus cher.



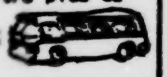
Temps ensoleillé

Réfléchissez à votre mode de transport.

Pouvez-vous économiser en laissant l'auto à la maison.

OPTIONS

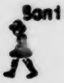
Je prendrai l'autobus pour rejoindre cette destination.
Perte de temps:
Attente éventuelle
Occasion de connaître plus de monde.
Boni: 20km et 5 $



Je vais à pied à ma destination

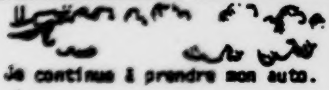
Perte de temps:

Boni: 15km et 10 $



Je prendrai ma bicyclette..

Pas de perte de temps
Coeur plus solide
Temps pour réfléchir
économies réalisées en dépenses d'auto, d'essence et autres.



Je continue à prendre mon auto.

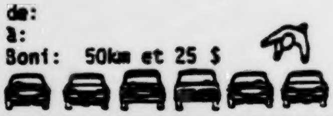
Augmentation des coûts:
1983-1985 - 100km et 100 $
1986-1988 - 250km et 300 $
1989-1992 - 500km et 500 $

Visite à un centre d'activité

Activités:
1.
2.
3.
Boni pour 2 - 25km et 10 $
pour 3 - 50km et 10 $

Reduction de la fréquence des visites.

de:
à:
Boni: 50km et 25 $



Je convertirai mon auto au propane.

Coût: 3000 $
Économie annuelle:
Boni: 100km

Je ne prends mon auto qu'en hiver.
* réduction des risques d'accidents
* diminution des frais d'entretien
* économie d'essence

Boni: 600km et 1000 $

Voyage en covoiturage

* économie d'essence
* bonne compagnie
* habitude d'organisation
* un peu de temps perdu

Boni: 500km et 200 $

Je prendrai ma motocyclette
aucune perte de temps risque de me tuer ou de me casser un membre.
Essence et entretien: 75 $

Patinage jusqu'à destination

(quand vous avez en main la carte du verglas)
* peu de perte de temps
* coeur plus solide
* temps pour réfléchir aux économies réalisées en dévenses d'auto, d'essence et autres.

Boni: 50 km et 25 $

J'abandonnerai cette activité pour économiser des km

Boni: 30 $ et 500km

Je prendrai un taxi

Coût: 25 $

Je prendrai la limousine

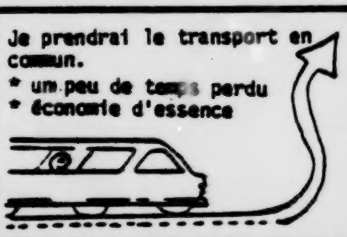
Coût: 5 $ par voyage

Nouvel emploi plus près de chez moi.

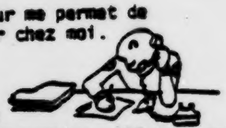
Economie: + 30km et 15 $ par voyage

Occasion de me rapprocher du centre-ville
Économie:
downtown
+ 30km et 15 $ par voyage.

Je prendrai le transport en commun.
* un peu de temps perdu
* économie d'essence



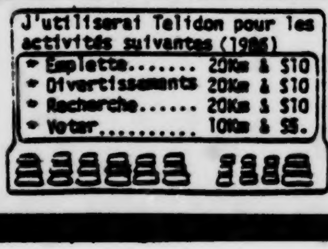
L'employeur me permet de travailler chez moi.



Economie:
1 jour par semaine...15 $ et 30km
2 jours par semaine..30 $ et 60km
3 jours par semaine..45 $ et 90km

Je resterai chez moi pour faire autre chose (Télévision, passe-temps...etc)

+ 10 km
+ 1 $



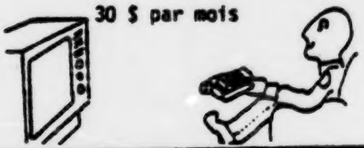
J'utiliserai Telidon pour les activités suivantes (1986)
* Emplette....... 20Km à $10
* Divertissements 20Km à $10
* Recherche...... 20Km à $10
* Voter.......... 10Km à $5.

Je convertirai mon auto à l'hydrogène.

Coût: 4000 $
Economie annuelle:
Boni: 200km

INVENTIONS

Télévision payante (1983)



30 $ par mois

SERVICE AUTOMOBILE
DE CALFEUTRAGE
(1983-1985)

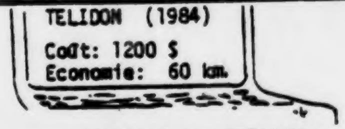
Coût: 300 $
Economie
annuelle: 200 $

Soins, services surveillance
médicaux à domicile.

gratuit...payés par
l'assurance-maladie.

TRICYCLE

Coût: 150 $
Economie annuelle:
800 km



TELIDON (1984)
Coût: 1200 $
Economie: 60 km.

par utilisation: emplettes,
travail, divertissements,
ecole, rencontres, recherche.

Sang synthétique

gratuit

CAPTEUR SOLAIRE PAS TROP CHER
Coût: 3000 $ (1986)
Economie annuelle: 800 $

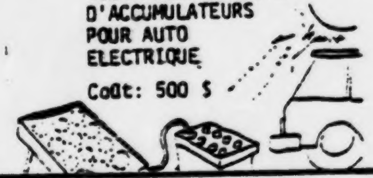
Conversion de l'auto

à L' HYDROGÉNE (1988)

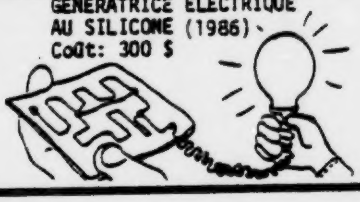
Coût: 3600 $
Economie: La moitié de
l'essence ou kilométrage

RECHARGEUR SOLAIRE
D'ACCUMULATEURS
POUR AUTO
ELECTRIQUE

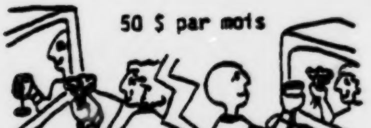
Coût: 500 $



GENERATRICE ELECTRIQUE
AU SILICONE (1986)
Coût: 300 $



Téléviseurs récepteurs-émetteurs



50 $ par mois

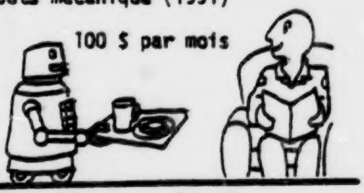
AUTO ELECTRIQUE (1990)

Coût: 18000 $
Kilometrage
illimité

Réduction des heures de
sommeil requises
gratuit
(1992)

Maîtrise complète
de son poids...!
gratuit

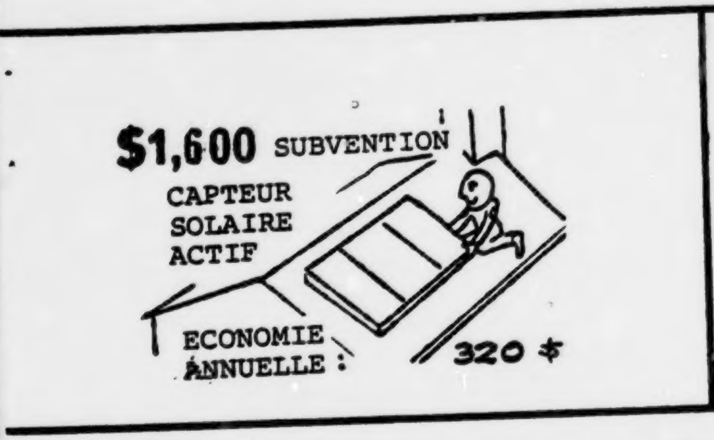
Robots mécanique (1991)



100 $ par mois

3-D Télévision (1995)
40 $ par mois

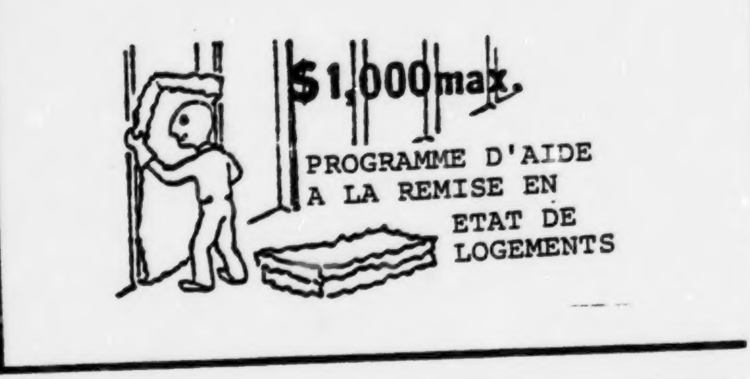
SUBVENTIONS



$1,600 SUBVENTION

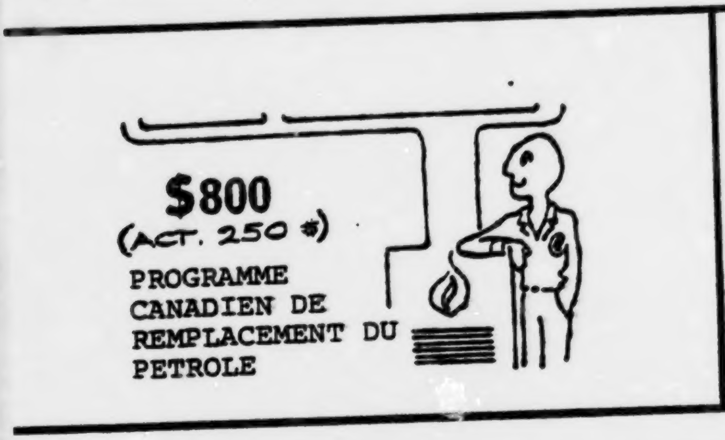
CAPTEUR SOLAIRE ACTIF

ECONOMIE ANNUELLE : 320 $



$1,000 max.

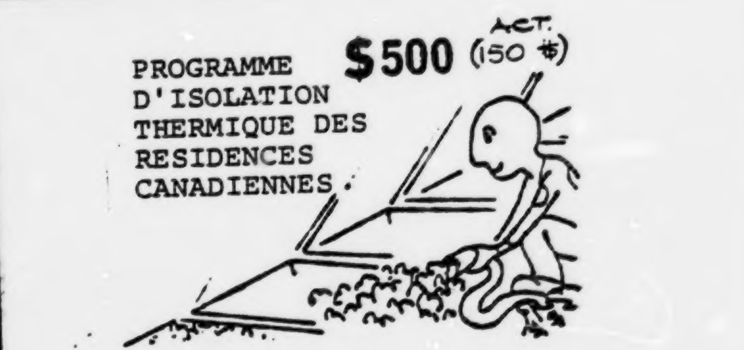
PROGRAMME D'AIDE A LA REMISE EN ETAT DE LOGEMENTS



$800

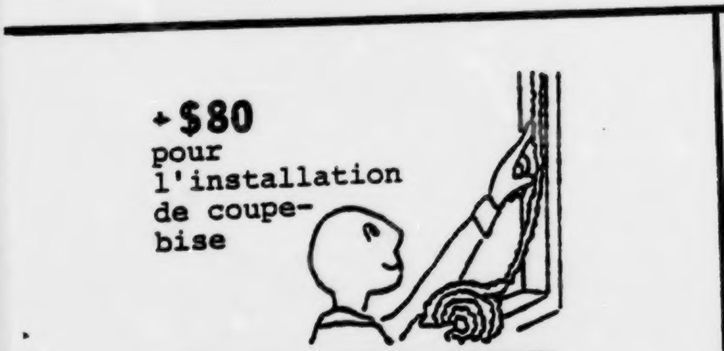
(ACT. 250 $)

PROGRAMME CANADIEN DE REMPLACEMENT DU PETROLE

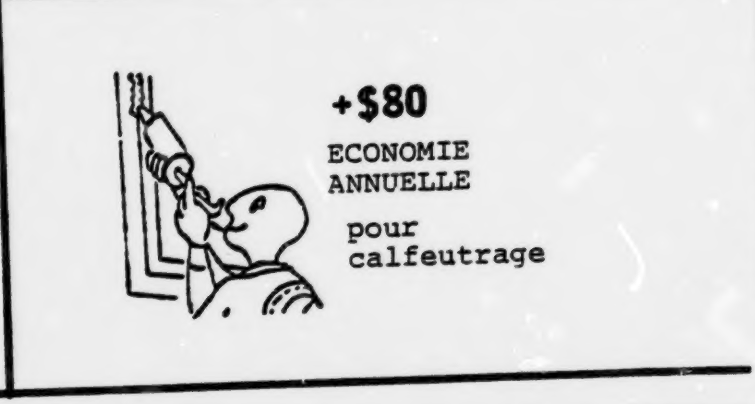


PROGRAMME D'ISOLATION THERMIQUE DES RESIDENCES CANADIENNES.

$500 ACT. (150 $)

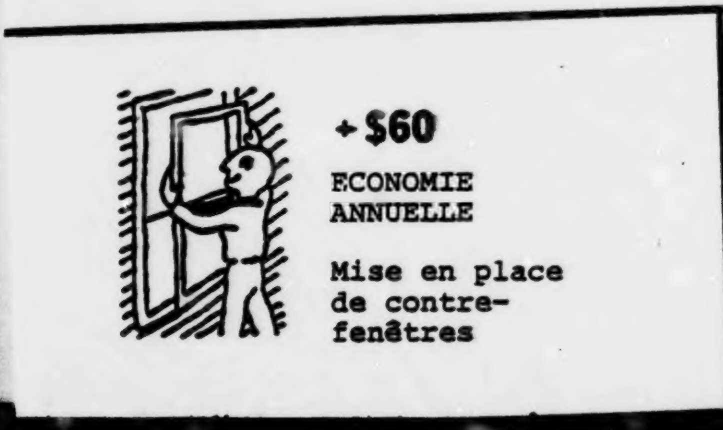


+$80 pour l'installation de coupe-bise



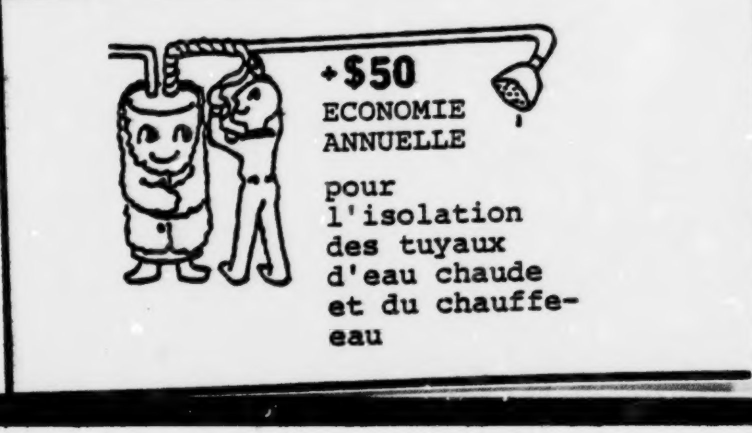
+$80 ECONOMIE ANNUELLE

pour calfeutrage



+$60 ECONOMIE ANNUELLE

Mise en place de contre-fenêtres



+$50 ECONOMIE ANNUELLE

pour l'isolation des tuyaux d'eau chaude et du chauffe-eau

CHANCE

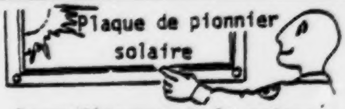
Bref rationnement du pétrole
-1% de km du kilométrage
annuel restant.

Brève surabondance de pétrole

+ km par 1% de kilométrage annuel
restant.

Journée de Soleil

Boni attribué en récompense de
votre enthousiasme pour
l'économie...
+ 50 $ et 250km

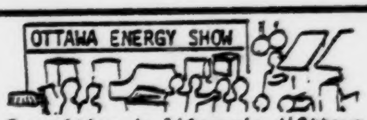


Agrandissement de la maison
à cause de la famille plus
nombreuses, sans nuire à
l'ensoleillement (droit à la
lumière etc.) Je garde ma
carte.
Valeur de la maison augmente
de 5% quand je vendrai.

ENERGY WEEK

Semaine de l'énergie

Education et information
Prix à gagner 100 $ et 110km



Exposition de l'énergie d'Ottawa

Eveil à la question...achat de
matériel et de services de
rénovation.

Coût: 5 $
Economie annuelle: 50 $

Isolation obligatoire

Dépense de 100 $ pour
amener la maison à un
niveau acceptable (emprunt
ou paiement comptant)

CERTIFICATE OF
ENERGY EFFICIENCY 1983-84

Certificat d'efficacité
énergitique 1983-1984

Isolation installée
volontairement 8% ajoutés
à la valeur de la maison.

Ma maison subit une vérification
énergétique dans le cadre du
Plan d'action énergétique de la
Ville. Boni: + 30 $

L'accès au soleil est
protégé chez moi.

Installation
de plus grandes fenêtes au sud.

Coût: 300 $
Economie annuelle: 200 $

INSTRUCTIONS FOR INTERVIEWERS

- or person playing the BANK

1. Having checked that the household does use a car, set up the game by placing the chips for facilities used in 1982 on the board, in approximate locations.

2. Establish the annual kmileage needed to visit each facility, as described in 1 of the Game Instructions, assuming:

   No. of working days in a year = 280
   No. of school days in a year = 220
   Weekly frequency of visits/yr. = 52
   No. of working day in a week = 5

   'Other frequency' = as indicated by respondent, or = 6

3. Establish 1982 ANNUAL BUDGET OF KMS OR MILES by adding up the annual kmileage for all facilities.

4. When player goes to work, the mode of transport he or she chooses, must be compatible with the weather shown on the WEATHER CARD.

5. Keep an account of car kmileage used on 'mix of modes' transportation and record it.

6. Increase salaries by 6% by multiplying by 1.06 from year to year, then averaging for the period. Here is an example of $20,000.00 salary NET - i.e. after deduction of taxes.

	Year	Salary
Base:	(1982	$20,000)
	1983	21,200
	1984	22,472
	1985	23,820
	TOTAL	67,492

Average annual salary
for the period 1983-85
= $22,497

Year	Salary
1986	25,250
1987	26,764
1988	28,370
TOTAL	26,794

Average 1986-88 =
= $26,794

Year	Salary
1989	30,072
1990	31,877
1991	33,790
1992	35,817
TOTAL	131,556

Average 1989-92
= $32,889
(Don't forget to divide by
4 in this period.)

7. When calculating the cost of gasoline, use the low estimate of the prices shown on Table 1, unless the household head tells you that he uses unleaded or high octane (ULTRA, SUPER etc.) gasoline. Base the consumption on Table 2 data.

8. If the house is heated by oil, use the low estimate and base the consumption on the annual average that the head of the household indicates to you.

9. Find the NET DISPOSABLE INCOME by using the percentage shown on Table 3 and the NET HOUSEHOLD INCOME stated on the last page of the Questionnaire.

10. Diminish the Net Disposable Income by the amount shown on an INVENTION card and add to the income for GRANTS. Similarly for CHANCE rewards.

11. As the player starts to plan a journey to a facility, it would help to remind him the kmileage available to him for the particular period -
    i.e. (1982 kmileage) x 0.7 = (1983-85) kmileage
    (1982 kmileage) x 0.3 = 1986-88 kmileage

    (No kmileage avalable for the period 1989-92 except by purchase at price shown on Table 1)

12. You should carefully record the visits in ROUND-TRIP fashion by forming a list of them as he plans his trip. You could remind him the pairs he ticked in Part 2 of the Questionnaire. In the last period of the game (1989-92) the householder may suggest any combinations, regardless of what he ticked in Part 2, or what may or may not exist in Ottawa.

13. Please write in all the information required on the "record of the game", and on the "suggested combinations of facilities".

BEST OF LUCK
Do not hesitate to call me on queries.
Gary Armen: (0) 563-3000 (H) 235-0600

TABLE 1

Long Term Energy Price Projections
December 1982
Ministry of Energy

Year	Regular Gasoline Cents per litre Low Projection	Regular Gasoline Cents per litre High Projection	Light Heating Oil Cents per litre Low Projection	Light Heating Oil Cents per litre High Projection
December 1982	42.74	42.74	29.78	29.73
1983	47.17	47.88	32.03	33.59
1984	50.78	51.69	35.64	36.35
1985	54.97	56.08	38.66	39.54
1986	59.88	61.87	42.25	43.82
1987	65.79	68.93	46.60	49.09
1988	72.41	76.32	51.47	54.57
1989	79.28	84.75	56.51	60.87
1990	86.66	92.95	61.94	66.93
1991	93.42	101.32	66.88	73.75
1992	101.35	112.04	72.70	81.23

Low Projection refers to a lower world price estimated to increase at 1/2% per annum

High Projection refers to higher world price scenario and is estimated on increases in the order of 1.8% per annum

---

TABLE 2

Urban Fuel Consumption By Various Cars (Extracted from Transport Canada tables)

	L/100 km		L/100 km
AMC Concord	12.4	Imperial	15.8
Audi	12.6	Jaguar	16.6
BMW	10.2	Lincoln	16.8
Buick	10.9	Mercedes 240D	9.1
Cadillac	14.8	Mercedes 380	13.6
Chevrolet	10.6	Mercury Capri	10.7
Caprice	16.3	Oldsmobile	10.9
Chevette	8.1	Peugeot	10.0
Citation	9.6	Plymouth	7.8
Corvette	15.8	Pontiac	10.3
Chrysler	13.5	Porsche	15.6
Datsun Nissan	7.9	Renault	7.3
Datsun 280 ZX	12.5	Rolls Royce	27.5
Datsun 810	11.4	Saab	12.7
Dodge: AS	9.6	Subaru	8.8
Colt	7.5	Toyota Celica	9.7
Omni	7.8	Toyota Corolla	7.8
Fiat	9.9	Toyota Tercel	8.7
Ford Escort	9.4	Volkswagen	10.1
LTD	12.6	Volkswagen Rabbit	9.6
Mustang	10.7	Volvo	8.2
Thunderbird	12.7	Volvo Turbo	12.8
Honda Accord	8.6		
Honda Civic	7.9		

Metric Conversion Table

L/100 km	MPG	L/100 km	MPG
7.0	40.4	13.0	21.7
7.2	39.4	14.0	20.2
7.4	38.2	15.0	18.8
7.6	37.2	16.0	17.7
7.8	36.2	18.0	15.7
8.0	35.3	20.0	14.1
9.0	31.4	22.0	13.6
10.0	28.2	24.0	12.3
11.0	25.7	26.0	11.4
12.0	23.5	28.0	10.1

GAcagb-1
D88087

OTTAWA ENERGY BUDGET GAME

TABLES

TABLE 3

% EXPENDITURE PER PERSON IN OTTAWA

ITEM	Approx. Ave % allocation of income, if NET HOUSEHOLD INCOME equals: Less than $10,000.	$10,001 to $20,000	$20,000 to $30,000	Over $30,000 +
Housing	38.0	32.0	28.0	25.3
Food	10.0	8.0	5.0	3.0
Entertainment	7.5	6.5	6.4	6.2
Transportation	13.0	10.0	8.8	5.5
Retail goods	12.0	13.0	15.0	16.2
Personal Services	2.5	1.5	1.3	0.8
Home improvement	2.0	2.5	3.5	3.0
TOTAL ALLOCATED ($)	85.0	73.5	68.0	59.5
DISPOSABLE INCOME ($)	15.0	26.5	32.0	40.5

APPENDIX 4

BRIEF NOTE ON STATISTICAL TECHNIQUES

- Selection of samples
- Correlation of urban uses
- Significance of a correlation
- Principal components and factor analysis

BRIEF NOTE ON STATISTICAL METHODS

A. THE SELECTION OF SAMPLES

The simplest method of determining the size of sample to yield reliable results from a survey, within reasonable expenditure of resources is to proceed as follows:

1. Determine the resources available;

2. Determine the percentage of accuracy which would be satisfactory for the particular piece of research. A ±5% variation when comparing the popularity of three political parties may be grossly unsatisfactory, but a 10% difference in the price of a book between a bookstore round the corner as opposed to bookstore in Toronto may be quite acceptable.

3. Use the formula for the STANDARD ERROR OF A SAMPLING DISTRIBUTION of TWO PROPORTIONS which is also known as the STANDARD ERROR of RELATIVE FREQUENCIES, to calculate approximate error with various sample figure assumptions.

4. Following a number of trials with different figures, select the most satisfactory sample.

In the case of the survey of Energy Use and Household Trips in 1982 this procedure was applied as follows:-

1. RESOURCES AVAILABLE: Junior and High School students to distribute and collect the survey forms; Time available - 1 month; Money allocated: \$2,000 - \$2,500.

2. ACCURACY REQUIRED for the project: ±2.0%. The objectives of this survey were to establish an average indication of household expenditure on energy, trip length, characteristics, lifestyles classification and factor analysis as to what distinguishes households in their behaviour in relation to energy. As most of these objectives were qualitative and they could be determined within 4% to 5% variation of characteristics, the figure of ±2.0% was acceptable.

3. The formula for the 'Standard ERROR of a Sampling Distribution of Two Proportions is as follows:-

$$\sigma = \sqrt{\frac{pq}{N}}$$

where: 'P' = Number of households selected for the survey

'q' = Number of the remaining households in the City

'N' = Total number of households in the City

4. A range of alternative figures were inserted in the above formula, on the basis of 111,000 households in the City as follows:

a. Survey sample: 1,000 households

Therefore: 'p' = 1,000 'q' = 110,000

Standard error = $\sqrt{1{,}000 \times 110{,}000/111{,}000}$

$= \pm 3.11\%$

b. Survey sample: 2,000 households

Therefore: 'p' = 2,000 'q' = 109,000

Standard error = $\sqrt{2{,}000 \times 109{,}000/111{,}000}$

$= \pm 1.44\%$

c. Survey sample: 3,000 households

Therefore: 'p' = 3,000 'q' = 108,000

Standard error = $\sqrt{3{,}000 \times 108{,}000/111{,}000}$

$= \pm 0.17\%$

CONCLUSION

On the basis of the above three trials, a selection of 2,000 households would yield a satisfactory margin of accuracy. Although this round figure of 2,000 could be refined to say 1,800 to yield a figure nearer to ±2.0%, the uncertainty of how many households would actually respond, does not make further trials worthwhile.

The selection of 500 households for the Ottawa Energy Budgets Game was based on an Standard Error of ± 0.69%, because a greater accuracy was required for the quantitative results expected from that survey. The sample was based on households living in Dalhousie, Capital and Billings Wards as opposed to the City of Ottawa as a whole.

GA:baw-2

D2D132

B. CORRELATION OF URBAN LAND USES

Pearson's product-moment correlation analysis was used to establish the similarity of various facilities in order to formulate pairs of activities which the consumer might find convenient to carry out at the same location and one after the other. The relevance of such conveniently paired activities to energy conservation is obvious: the fewer the destinations to which the consumer has to travel in a city, the less energy he will have to consume in travel, in order to satisfy his lifestyle needs. The pairing of activities is only the first step towards the formulation of chains of activities to help the urban planner and architect conceive facility complexes which will offer convenience to the consumer and help to minimize travel in the city.

The basic assumption in the correlation analysis of urban land uses - i.e., urban facilities - is that if access, transport, frequency of use, hours of operation and other characteristics of any two facilities are very similar - as in the case of the baker and the grocer, for example - then consumers are most likely to go from one to the other and satisfy their needs - i.e., the purchase of bread and groceries - on the same visit to the location of these two facilities. Needless to say, this is very common urban experience, but the combination of such similar facilities has always been left to instinct and chance. The objective of this research project was a systematic and mathematical approach to this subject, particularly as energy scarcity makes it highly relevant to urban life at present and for the foreseable future.

The object of correlation analysis in this exercise was to establish the degree of similarity between pairs of facilities by some quantitative indication, rather than by simple notation of 'similar' vs. 'dissimilar'. When two facilities are to be compared in their hours of operation for example, a quantitative expression for both of them being open to the consumer from 9:00 a.m. to 5:00 p.m. would be "100% common hours of operation." This percentage could be calculated on the basis of the overlap between the hours of operation of any two facilities. A bank and a night club for example would have "0% common hours of operation" and there would be little sense in locating them next to each other - unless the bank incorporated automatic cash deposit and withdrawal facilities, which would increase the percentage of overlap.

The aspects of similarity between facilities which were considered relevant to the formulation of linkages between them with a view to forming urban complexes towards greater energy-efficiency in the city were as follows:-

- Common hours of operation;
- Transport mode requirements: Going to the park for example has minimal "private car use requirement" while going to the family cottage has maximal.
- "Frequency-of-visits" requirement: According to the 1982 Survey of Energy Use and Household Trips, the primary school has 92.9% daily visits while the zoo on the other hand is visited once a year by 96.7% of the respondents mentioning the activity as part of their lifestyle.
- Similarity of "demand-cone": As the diagram on the following page shows, a demand cone describes the shape of the market for a facility in terms of the number of consumers visiting that facility from various distances or accessibility zones. A primary school, community centre and convenience store for example, have similar demand cones, according to the above-mentioned Survey.

- Age, socio-economic group and education level of the consumers of the service or activity offered by a facility. All these data were derived in quantitative form from the Survey.

After recording the quantitative value of each facility on these aspects of similarity, an SPSS computer program was used to calculate the correlation coefficient between all possible combinations of the 69 facilities studied in the Survey of Energy Use and Household Trips. Out of 4,761 possible combinations, only 80 were significant, as shown by the correlation coefficients on Table 5, in Appendix 5.

Each of these coefficients indicates the following:-

a. The degree of similarity of two facilities, when considered in the aspects studied in this project;

b. The probability of both of them being part of a multi-purpose trip by a household in Ottawa;

Table 6 in Appendix 5 shows the pairs of facilities scoring the highest significant correlations. The significance of these correlations was tested by reference to Student's 't' test (see explanation on the next page). It was also tested by including the "Table of pairs of facilities convenient to use together" in the Survey preceding the Ottawa Energy Budgets Game - See Appendix 3. These two tests - one theoretical, the other practical - allowed the combination of facilities into clusters - as shown on Table 10 in the Final Report volume - on a high level of statistical confidence. (i.e., 95% to 99.5%).

C. THE SIGNIFICANCE OF A CORRELATION

The confidence which may be placed on a correlation co-efficient depends on the number of observations considered in the computation and the value of the co-efficient itself. Evidently, one cannot reach a reliable conclusion from, say, only four observations, even if three of them tell the same story. A statistical table devised by a mathematician by the name Student, helps to establish the degree of confidence which may be placed on a given value of a correlation co-efficient, according to the sample on which the calculations are based.

This table is given in STATISTICAL TABLES FOR BIOLOGICAL AND OTHER RESEARCH by Fisher and Yates (1957) and indicates that if a calculation is based on 100 observations and produces a correlation co-efficient of more than 0.240, then the result may be accepted with a confidence of 99.9% - i.e., a chance of only 1 in 1000 of being wrong. As the data describing the quantitative characteristics of each facility were based on the response of 604 households forming the sample for the Survey of Energy Use and Household Trips, the results may be accepted with full confidence.

D. PRINCIPAL COMPONENTS AND FACTOR ANALYSIS

These two mathematical techniques are essentially a means of extracting the most significant messages from a large number of facts about a subject or problem. In this project they were used to summarize all the data collected through the Survey of Energy Use and Household Trips - over 78,000 bits of information - into a few messages to explain the behaviour of various households as regards the use of energy. The result was the classification of lifestyles in 1982, and 1992 to establish differences and implications for urban planning.

As a first step, the computation involved the calculation of correlation co-efficients between all the variables describing the households. Subsequently the program combined similar variables to form significant factors, which concentrated on them several variables. Graphically, these factors were at right angles to each other ('orthogonal projection') in order to provide independent, rather than overlapping message s. Each of the factors explained a certain percentage of the variance between the behaviour of households and the first six factors explained 63.9% of the total variance as follows (Table 2 in Final Report volume): -

1.	Vulnerability of a lifestyle to energy shortfall	14.4%
2.	Energy waste	13.3%
3.	Age of household head, distance to critical facilities and total annual kmileage	11.6%
4.	Conserver habits	9.0%
5.	Home and family characteristics	8.3%
6.	Outlets, education, bus expenditure	7.3%
	TOTAL	63.9%

These six factors or 'messages' are logically related to the behaviour of various households in relation to energy and they were used as scales to estimate the location of each household on a ladder between the extremes of conserver vs. frivolous lifestyles.

GA:agb-2
D2D134

APPENDIX 5

TABLES LEADING TO THE HYPOTHESIZED CLUSTERS OF FACILITIES SHOWN ON TABLE 10, IN SECTION 3 OF THE FINAL REPORT

Table 1 Household trips to various destinations in 1982, analyzed by EDUCATIONAL ATTAINMENT LEVEL OF HOUSEHOLD HEADS

Abbreviations: PS = Primary School Education UU = University Undergraduate
SS = Secondary School Education PG = Post-Graduate Education
TC = Technical College
The most popular destinations have been marked with an asterisk *

DESTINATION VISITED	PS	SS	TC	UU	PG	TOTAL
Nursery/Daycare	6	22	6	12	7	53
Primary School	7	31	7	39	18	102
Secondary School	5	43	7	21	12	88
Community College	2	10	4	18	3	37
University	3	18	8	50	27	106
Specialized College	-	1	1	-	1	3
TOTALS (Educ'n)	23	124	33	140	68	389
Park/Play Area	7	63	21	88	40	219*
Sports Arena	4	41	5	52	15	117*
Tennis Court	4	13	6	38	25	86
Bowling Alley	2	26	4	10	1	43
Golf Course	1	27	7	30	6	71
Sailing Base	-	12	3	16	7	38
Swimming Pool	3	47	15	64	30	159*
Race Track	1	12	2	7	1	23
Provincial Park	5	32	13	32	17	99
Zoo	-	6	5	13	3	27
Botanical Gardens	1	28	8	39	16	92
Cottage	5	45	12	60	19	141*
Running (Canal)	2	10	1	12	24	29
Skating (Canal)	-	18	3	31	10	62
Curling	1	4	2	11	1	19
TOTALS (Recr'n)	35	384	107	503	195	1,225
Restaurant	11	129	40	149	61	390*
Movies	8	81	25	125	49	288*
Theatre	5	44	13	98	45	205*
Night Club	5	21	11	38	7	82
Bingo Hall	3	12	2	4	-	21
Dancing	4	18	6	23	4	55
Private Parties	-	11	-	10	1	22
Tavern	-	4	1	7	1	13
TOTALS (Entm't)	36	320	98	454	168	1,076
Library	7	66	19	110	47	249*
Church	14	109	21	80	26	250*
Community Centre	2	27	8	26	18	81
Museum	1	46	16	75	36	176*
Art Gallery	1	24	9	57	32	123
Concert	-	33	9	65	36	143

DESTINATION VISITED		PS	SS	TC	UU	PG	TOTAL
Club/Society	1	3	41	12	48	21	125
Club/Society	2	2	6	2	11	7	28
Club/Society	3	1	2	2	6	-	11
Club/Society	4	-	3	-	3	-	6
TOTALS (Culture)		31	357	98	481	223	1,192
Family Doctor		21	154	34	146	57	412*
Dental Facility		12	111	31	139	51	344*
Pharmacy		17	96	24	105	40	282*
Hospital		12	70	16	71	27	196*
Clinic		3	25	8	26	9	71
Optician		1	6	-	9	3	19
Eye Doctor		-	1	-	1	-	2
TOTALS (Health)		66	463	113	497	187	1,326
Convenience Shops		16	113	39	146	58	372*
Shopping Centre		22	167	35	169	65	458*
Bank		22	153	37	158	67	437*
Market		1	9	2	18	9	39
Ext. hours stores		1	9	2	10	5	27
TOTALS (Shop'g)		62	451	115	501	204	1,333
City Hall		5	23	7	36	12	83
Regional Government		2	5	3	12	9	27
Provincial Ministry		2	6	3	14	4	29
Federal Ministry		2	13	5	27	5	52
TOTALS (Admin.)		11	47	18	89	30	191
Husband's Workplace		15	102	24	116	61	318*
Wife's Workplace		9	59	22	75	41	206*
Sibling 1 Workplace		5	48	12	45	11	121
Sibling 2 Workplace		1	13	1	18	2	35
Sibling 3 Workplace		-	3	-	3	-	6
TOTALS (Work)		30	225	59	257	115	686
Social Visits (1)		15	150	35	166	63	429*
Social Visits (2)		8	76	18	102	38	242*

DESTINATION VISITED	PS	SS	TC	UU	PG	TOTAL
Social Visits (3)	6	47	12	66	26	157
Social Visits (4)	3	25	9	42	14	93
Social Visits (5)	3	16	8	19	10	56
Social Visits (6)	1	13	5	8	4	31
Social Visits (7)	1	7	2	3	3	16
Social Visits (8)	-	7	1	1	2	11
TOTALS (Social)	37	341	90	407	160	1,035
GRAND TOTALS (All trips)	331	2,712	731	3,329	1,350	8,453

Table 2 : Household trips to various destinations in 1982, analyzed by EDUCATIONAL ATTAINMENT LEVEL OF 2ND HOUSEHOLD MEMBER

Abbreviations: PS = Primary School Education
SS = Secondary School Education
TC = Technical College
UU = University Undergraduate
PG = Post-Graduate Education
The most popular destinations have been marked with an asterisk *

DESTINATION VISITED	PS	SS	TC	UU	PG	TOTAL
Nursery/Daycare	5	26	1	13	1	46
Primary School	15	36	9	32	7	99
Secondary School	4	47	6	24	4	85
Community College	1	14	7	9	1	32
University	5	22	7	44	11	89
Specialized College	-	1	-	1	1	3
TOTALS (Educ'n)	30	146	30	123	25	354
Park/Play Area	15	68	22	62	15	182*
Sports Arena	7	47	6	30	7	97*
Tennis Court	3	14	12	28	10	67
Bowling Alley	3	24	3	5	3	38
Golf Course	2	30	7	20	3	62
Sailing Base	1	14	4	10	2	31
Swimming Pool	9	47	11	55	13	135*
Race Track	1	13	1	6	1	22
Provincial Park	9	32	9	18	5	73
Zoo	1	9	4	9	2	25
Botanical Gardens	3	29	9	31	8	80
Cottage	7	48	9	48	10	122*
Running (Canal)	1	10	2	11	4	28
Skating (Canal)	2	20	7	20	3	52
Curling	2	4	1	7	2	16
TOTALS (Recr'n)	66	409	107	360	88	1,030
Restaurant	16	132	33	109	21	311*
Movies	15	84	20	89	19	227*
Theatre	10	56	11	68	17	162*
Night Club	7	19	4	19	4	53
Bingo Hall	1	15	1	1	-	18
Dancing	5	21	3	11	2	42
Private Parties	1	8	4	6	-	19
Tavern	-	3	3	6	-	12
TOTALS (Entm't)	55	338	79	309	63	844
Library	14	73	18	78	16	199*
Church	11	105	18	64	8	206*
Community Centre	4	29	8	21	7	69
Museum	5	45	18	59	16	143*
Art Gallery	6	21	10	44	14	95
Concert	6	31	10	49	15	111

DESTINATION VISITED	PS	SS	TC	UU	PG	TOTAL
Club/Society 1	4	48	6	34	9	101
Club/Society 2	2	9	4	8	-	23
Club/Society 3	1	3	2	1	-	7
Club/Society 4	-	-	2	1	-	3
TOTALS (Culture)	53	364	96	359	85	957
Family Doctor	26	160	30	110	22	348*
Dental Facility	20	126	28	100	22	296*
Pharmacy	17	107	22	75	12	233*
Hospital	14	82	14	50	10	170
Clinic	5	28	7	13	3	56
Optician	1	7	2	3	2	15
Eye Doctor	-	1	-	-	-	1
TOTALS (Health)	83	511	103	351	71	1,119
Convenience Shops	20	121	29	109	23	302*
Shopping Centre	25	172	33	124	21	375*
Bank	25	161	31	114	25	356*
Market	1	10	3	16	6	36
Ext. hours stores	1	6	3	9	4	23
TOTALS (Shop'g)	72	470	99	372	79	1,092
City Hall	6	27	7	19	8	67
Regional Government	4	6	2	8	2	22
Provincial Ministry	2	9	2	10	-	23
Federal Ministry	4	20	4	10	3	41
TOTALS (Admin.)	16	62	15	47	13	153
Husband's Workplace	15	117	27	100	24	283*
Wife's Workplace	12	73	19	65	22	191*
Sibling 1 Workplace	10	39	12	32	4	97
Sibling 2 Workplace	2	12	4	14	1	33
Sibling 3 Workplace	-	4	1	-	1	6
TOTALS (Work)	39	245	63	211	52	610
Social Visits (1)	20	156	32	117	23	348*
Social Visits (2)	12	81	17	73	13	196*

DESTINATION VISITED	PS	SS	TC	UU	PG	TOTAL
Social Visits (3)	8	52	10	52	11	133*
Social Visits (4)	6	28	6	32	7	79
Social Visits (5)	4	15	3	23	4	49
Social Visits (6)	1	9	2	10	3	25
Social Visits (7)	-	5	2	5	1	13
Social Visits (8)	-	4	2	4	-	10
TOTALS (Social)	51	350	74	316	62	853
GRAND TOTALS (All trips)	465	2,895	666	2,448	538	7,012

GA:cse-3
D2D017

TABLE: 3 THE MOST POPULAR DESTINATIONS & ACTIVITIES OF OTTAWA LIFESTYLES IN 1982

A. ANALYSIS BY EDUCATION OF HOUSEHOLD HEAD

DESTINATION	% OF HSLDS. VISITING	% HAVING COMPLETED: PS*	SS*	TC*	UU*	UG*
Shopping Centre	75.8	4.8	36.4	7.6	36.9	14.2
Bank	72.3	5.0	35.0	8.4	36.1	15.3
Social Visit (1)	71.0	3.5	34.9	8.1	38.7	14.7
Family Doctor	68.2	5.1	37.4	8.2	35.4	13.8
Restaurant	64.6	2.8	33.1	10.2	38.2	15.6
Convenience Shops	61.6	4.3	30.4	10.5	39.2	15.6
Dental Facility	56.9	3.4	32.3	9.0	40.4	14.8
Husband's Workplace	52.6	4.7	32.1	7.5	36.5	19.2
Movies	47.7	2.8	28.1	8.6	43.4	17.0
Pharmacy	46.7	6.0	34.0	3.5	37.2	14.2
Church	41.4	5.6	43.6	8.4	32.0	10.2
Library	41.2	2.8	26.5	7.6	44.2	18.9
Social Visit (2)	40.1	3.3	31.4	7.4	42.1	15.7
Park/Play Area	36.2	3.2	28.6	9.5	40.0	18.2
Wife's Workplace	34.1	4.3	28.7	10.7	36.4	19.9
Theatre	33.9	2.4	21.5	6.3	47.8	21.9
Hospital	32.4	6.1	35.7	8.2	36.2	13.8
Museum	29.1	0.5	26.1	9.1	42.6	20.5
Swimming Pool	26.3	1.9	29.4	9.4	40.3	18.9
Concert	23.7	---	23.1	6.3	45.5	25.2
Cottage	23.3	3.5	31.9	8.5	42.5	13.5

*Abbreviations:
PS = Primary School
SS = Secondary School
TC = Technical College
PG = Post-graduate
UU = University - undergraduate

GA:agb-4
D2D015

TABLE 4 : THE MOST POPULAR DESTINATIONS AND ACTIVITIES OF OTTAWA LIFESTYLES IN 1982.

B. ANALYSIS BY MODE OF TRANSPORT

DESTINATION	NO. OF HSLDS. VISITING	% OF TOTAL*	MODE OF TRANSPORT USED (%) PRIVATE	PUBLIC	OTHER
Shopping Centre	458	75.8	80.3	11.1	8.5
Bank	437	72.3	52.4	9.8	37.8
Social Visit (1)	429	71.0	80.4	7.2	12.4
Family Doctor	412	68.2	68.7	19.7	11.7
Restaurant	390	64.6	79.5	9.2	11.3
Convenience Shops	372	61.6	43.5	2.7	53.8
Dental Facility	344	57.0	65.1	22.1	12.8
Husband's Workplace	318	52.6	57.5	25.8	16.7
Movies	288	47.7	74.3	14.2	11.5
Pharmacy	282	46.7	55.7	9.6	34.8
Church	250	41.4	71.2	6.4	22.4
Library	249	41.2	47.0	18.5	34.5
Social Visit (2)	242	40.1	72.3	11.6	16.1
Park/Play Area	219	36.2	21.9	6.4	71.7
Wife's Workplace	206	34.1	50.5	30.6	18.9
Theatre	205	33.9	71.7	11.7	16.6
Hospital	196	32.4	77.0	19.4	3.6
Museum	176	29.1	62.5	16.5	21.0
Swimming Pool	159	26.3	45.3	17.6	37.1
Concert	143	23.7	68.5	11.2	20.3
Cottage	141	23.3	97.2	2.1	0.7

NOTE*: Total number of households surveyed was 604.

GA:baw-6
D2D015

TABLE 5 : THE MOST POPULAR DESTINATIONS & ACTIVITIES OF OTTAWA LIFESTYLES IN 1982

C. ANALYSIS BY NET HOUSEHOLD INCOME

DESTINATION	NO. OF HSLDS. VISITING * DESTINATION	% OF HSLDS. EARNING			
		LESS THAN $10,000	$10,001 TO $20,000	$20,001 TO $30,000	$30,001 AND OVER
Shopping Centre	458	9.5	23.1	27.7	39.7
Bank	437	10.2	25.1	25.8	39.0
Social Visit (1)	429	9.0	22.0	27.2	41.8
Family Doctor	412	10.2	23.1	27.3	39.4
Restaurant	390	6.8	22.6	28.2	42.4
Convenience Shops	372	8.7	23.4	25.5	42.4
Dental Facility	344	8.0	20.6	26.3	45.1
Husband's Workplace	318	2.5	15.5	26.5	55.5
Movies	288	5.8	20.3	29.0	44.9
Pharmacy	282	11.2	25.4	23.9	39.5
Church	250	9.4	25.7	27.8	37.1
Library	249	10.6	20.9	25.1	43.4
Social Visit (2)	242	8.3	20.8	28.3	42.5
Park/Play Area	219	10.5	22.4	27.6	39.5
Wife's Workplace	206	4.8	17.4	22.2	55.6
Theatre	205	7.5	18.0	27.5	47.0
Hospital	196	12.9	24.2	23.7	39.2
Museum	176	11.2	18.2	29.4	41.2
Swimming Pool	159	8.4	20.1	26.6	44.8
Concert	143	7.2	23.0	25.9	43.9
Cottage	141	2.9	16.1	35.0	46.0

NOTE *: Total number of households surveyed was 604.

GA:baw-2
D2D037

TABLE 6 : RANKING OF THE MOST POPULAR DESTINATIONS BY ANNUAL CAR KMILEAGE OF TRAVEL CAUSED TO SURVEY RESPONDENTS IN 1982

DESTINATIONS RANKED BY VALUE OF: (A X B X C X D)	NO. OF VISITORS IN 1982 (A)	% BY CAR (B)	ANNUAL TOTAL OF VISITS* (C)	AVE. NO. OF KMS TRAVEL'D (D)	TOTAL KMILEAGE TRAVELLED BY ALL RESPONDENTS (A X B X C X D)
Husband's Workplace	318	57.5	280	14.1	721,892
Shopping Centre	458	80.3	262	7.2	693,769
Restaurant	390	79.5	94	12.1	352,651
Cottage	141	97.2	38	64.5	335,914
Social Visit (1)	429	80.4	254	3.3	289,108
Wife's Workplace	206	50.5	280	9.2	267,981
Social Visit (2)	242	72.3	42	29.2	214,578
Movies	288	74.3	73	10.2	159,332
SUB-TOTAL for 8 destinations (6 types of activities)					3,035,225
Convenience Shops	372	43.5	271	3.6	157,872
Family Doctor	412	68.7	43	10.2	124,143
Bank	437	52.4	82	5.1	95,763
Swimming Pool	159	45.3	186	7.1	95,119
Church	250	71.2	52	7.8	72,197
Pharmacy	282	55.7	51	8.1	64,887
Library	249	47.0	52	7.7	46,859
Park/Play Area	219	21.9	204	3.6	35,222
Dental Facility	344	65.1	18	8.3	33,457
Theatre	205	71.7	24	9.1	32,101
Museum	176	62.5	15	12.3	20,295
Hospital	196	77.0	12	9.9	17,929
Concert	143	68.5	10	9.2	9,012
TOTAL for 21 destinations (18 types of activities)					3,840,081

$$\frac{\text{Sub-total for 6 types of activity}}{\text{Total for 18 types}} = 79.04\%$$

NOTE: *Annual total of visits has been rounded to the nearest whole number.

GA:mm-4
D2D037

1982 PATTERNS OF HOUSEHOLDS TRIP AND ENERGY USE

Key findings according to the Control Sample

A. HOUSEHOLD TRIPS BY TRANSPORT MODE (%)

Destination	Private Car	Public Transport	Other (cycling walking, etc.)	Several modes
Primary School	12.0	24.0	64.0	----
Secondary School	17.6	52.9	29.5	----
Community Call	50.0	20.0	20.0	10.0
University	41.7	25.0	33.3	----
Other (educ'l)	36.4	18.2	27.3	18.2
Park/Play area	20.0	4.4	64.4	----
Sports Arena	40.7	3.7	44.4	----
Tennis Court	35.7	14.3	50.0	----
Bowling Alley	84.6	16.4	----	----
Golf Course	92.8	7.2	----	----
Sailing Base	42.8	28.8	14.2	----
Swimming Pool	41.9	13.0	35.5	9.6
Race Track	80.0	----	20.0	----
Provincial Park	89.5	----	10.5	----
Zoo	80.0	20.0	----	----
Botanical Gardens	55.0	5.0	20.0	20.0
Cottage	88.9	3.7	3.7	3.7
Other (rec'l)	70.6	5.9	23.5	----
Restaurant	72.0	8.0	10.0	10.0
Movies	64.9	12.7	8.8	14.0
Theatre	77.4	9.7	9.7	3.2
Night Club	68.8	----	6.2	25.0
Bingo	85.7	----	14.3	----
Dancing	84.6	7.6	7.6	0.2
Other (entm't)	100.0	----	----	----
Library	40.0	14.0	36.0	10.0
Church	71.2	5.1	18.6	5.1
Community Centre	37.5	6.3	43.8	2.4
Museum	53.1	12.5	25.0	9.4
Gallery	59.1	9.1	22.7	9.1
Concert	80.6	3.2	16.1	0.1
Clubs	76.7	3.3	10.0	10.0

Family doctor	36.1	18.2	37.4	8.3
Dental facility	43.2	26.3	20.3	10.2
Pharmacy	46.7	29.2	16.9	7.2
Hospital	60.3	26.3	1.8	11.6
Clinic	36.7	20.1	38.7	4.5
Other (med'l)	37.4	24.4	26.2	12.0
Convenience shops	46.6	2.7	34.2	16.5
Shopping centre	70.5	7.3	6.3	15.9
Bank	48.9	12.0	26.1	13.0
Other (shopping)	50.0	16.6	----	16.6
City Hall	73.6	20.1	3.2	3.1
Regional Gov't	41.4	46.2	4.2	8.2
Provincial Gov't	45.3	38.6	8.8	7.3
Federal Gov't	46.1	32.1	16.2	5.6
Husband's journey to work	67.2	17.2	10.9	4.7
Wife's journey to work	47.7	27.2	13.6	11.5
Other 1 (work)	34.6	38.5	19.2	7.7
Other 2 (work)	24.1	52.1	23.6	0.2
Other 3 (work)	11.6	69.3	19.0	0.1
Social visits 1	68.2	13.2	19.2	0.4
Social visits 2	53.4	24.3	21.5	0.8
Social visits 3	49.6	18.8	31.0	0.6
Social visits 4	30.1	26.9	41.8	1.2
Social visits 5	13.4	32.7	53.9	---
Social visits 6	13.4	32.7	53.9	---

B. ENERGY USE

1. Total Annual Distance Travelled By Car

	%
No car families	9
Less than 5000 (km)	14
5 000-10 000	23
10 000-15 000	21
15 000-20 000	12
20 000-25 000	5
Over 25 000	16

2. Annual Expenditure on Car per household

Average $1,692.00

3. Annual Public Transit Expenditure per household

Average $271.00

4. Average Annual Expenditure per Household, per Energy Source

Electricity

Average $380.00

Natural Gas

Average $117.00

Oil

Average $527.00

Gasoline

Average $541.00

Solar

Average 0

5. Use of Various Types of Energy by Purpose

Purpose		Energy type		(% of use)	
	Electricity	Net gas	Oil	Gasoline	Solar
Space heating	19	17	72	---	1
Water heating	48	14	5	---	---
Battery Warning	15	---	---	---	---
Lighting	100	---	---	---	---
Appliances	70	4	1	4	---
Travel	1	0	4	54	---

C. PERSONAL CHARACTERISTICS OF HOUSEHOLD MEMBERS

1. Age

	%
Less than 20	23
20-29	18
30-49	29
50 and older	31

2. Occupation

	%
Student	24
Homemaker	13
Retired/Unemployed	13
White collar, working class	10
Blue collar, working class	13
Professional/Managerial	26
Self employed/owner	2

3. Education

	%
Elementary	15
Some High School	22
Completed High School	23
Community College	4
Some University	5
University degree	28

4. Total Net Income of Household

Less than 10 000	17
10 000 - 20 000	17
20 000 - 30 000	19
Over 30 000	48

GA:smr-4
A2B089

1982 PATTERNS OF HOUSEHOLD TRIP AND ENERGY USE

Key Findings According to Control Sample (A) and Large Sample (B) Analysis

A. HOUSEHOLD TRIPS TO VARIOUS FACILITIES BY TRANSPORT MODE (%)

Destination	Private Car		Public Transport		Other (cycling walking, etc.)		Several modes	
	A	B	A	B	A	B	A	B
Primary School	12.0	18.1	24.0	31.0	64.0	50.9	----	----
Secondary School	17.6	16.7	52.9	54.9	29.5	28.4	----	----
Community College	50.0	43.6	20.0	31.0	20.0	15.4	10.0	10.0
University	41.7	35.5	25.0	32.7	33.3	31.8	----	----
Other (educ'l) 1	36.4	39.2	18.2	17.9	27.3	23.6	18.2	19.3
2	----	----	----	33.3	----	66.7	----	----
Park/Play area	20.0	2.1	4.4	5.2	64.4	66.7	11.2	26.0
Sports Arena	40.7	43.0	3.7	7.5	44.4	39.6	11.2	9.9
Tennis Court	35.7	35.1	14.3	9.6	50.0	55.3	----	----
Bowling Alley	84.6	65.4	16.4	25.0	----	9.6	----	----
Golf Course	92.8	96.2	7.2	3.1	----	0.7	----	----
Sailing Base	42.8	50.5	28.8	22.6	14.2	10.3	14.2	16.6
Swimming Pool	41.9	43.7	13.0	14.9	35.5	34.9	9.6	6.5
Race Track	80.0	86.2	----	4.1	20.0	9.7	----	----
Provincial Park	89.5	81.3	----	10.3	10.5	8.4	----	----
Zoo	80.0	80.3	20.0	16.5	----	----	----	3.2
Botanical Gardens	55.0	57.3	5.0	6.9	20.0	22.7	20.0	13.1
Cottage	88.9	91.8	3.7	2.9	3.7	1.3	3.7	4.0
Other (rec'l) 1	70.6	74.4	5.9	6.3	23.5	18.4	----	0.9
2	----	82.8	----	4.7	----	11.0	----	1.5
3	----	71.2	----	9.3	----	16.0	----	3.5

Destination		Private Car		Public Transport		Other (cycling walking, etc.)		Several modes	
		A	B	A	B	A	B	A	B
Restaurant		72.0	74.1	8.0	9.4	10.0	10.5	10.0	6.0
Movies		64.9	62.3	12.7	15.8	8.8	9.9	14.0	12.0
Theatre		77.4	72.9	9.7	10.3	9.7	9.8	3.2	7.0
Night Club		68.8	70.1	----	2.2	6.2	7.1	25.0	20.6
Bingo		85.7	84.0	----	3.4	14.3	12.6	----	----
Dancing		84.6	79.4	7.6	7.9	7.6	9.7	0.2	3.0
Other (entm't)	1	100.0	82.6	----	4.3	----	13.0	----	----
	2	----	90.0	----	2.1	----	7.0	----	0.9
Library		40.0	41.5	14.0	15.2	36.0	34.3	10.0	9.0
Church		71.2	70.2	5.1	7.1	18.6	19.7	5.1	3.0
Community Centre		37.5	33.7	6.3	9.3	43.8	47.0	2.4	10.0
Museum		53.1	54.4	12.5	15.1	25.0	22.6	9.4	7.9
Gallery		59.1	49.9	9.1	19.1	22.7	22.8	9.1	8.2
Concert		80.6	78.6	3.2	8.3	16.1	10.4	0.1	2.7
Clubs	1	76.7	70.6	3.3	9.8	10.0	12.6	10.0	7.0
	2	----	51.5	----	21.2	----	27.3	----	----
	3	----	69.2	----	30.8	----	----	----	----
	4	----	42.9	----	30.6	----	14.3	----	12.2

Destination		Private Car		Public Transport		Other (cycling walking, etc.)		Several modes	
		A	B	A	B	A	B	A	B
Family doctor		36.1	32.5	18.2	20.1	37.4	38.3	8.3	9.1
Dental facility		43.2	44.8	26.3	22.9	20.3	19.7	10.2	12.6
Pharmacy		46.7	50.8	29.2	25.6	16.9	18.5	7.2	5.1
Hospital		60.3	64.9	26.3	21.0	1.8	4.1	11.6	10.0
Clinic		36.7	43.7	20.1	30.7	38.7	24.6	4.5	1.0
Other (med'l)	1	37.4	36.5	24.4	26.8	26.2	26.0	12.0	10.7
	2	----	98.0	----	2.0	----	----	----	----
Convenience shops		46.6	43.5	2.7	3.5	34.2	36.2	16.5	16.8
Shopping centre		70.5	70.2	7.3	11.5	6.3	8.3	15.9	10.0
Bank		48.9	52.5	12.0	10.5	26.1	26.0	13.0	11.0
Other (shopping)	1	50.0	67.6	16.6	14.3	----	1.2	16.6	16.9
	2	----	65.1	----	23.3	----	10.6	----	1.0
City Hall		73.6	64.9	20.1	22.5	3.2	9.6	3.1	3.0
Regional Gov't		41.4	45.2	46.2	35.5	4.2	9.0	8.2	10.3
Provincial Ministry		45.3	46.3	38.6	35.6	8.8	8.9	7.3	9.2
Federal Ministry		46.1	49.1	32.1	29.8	16.2	15.1	5.6	6.0

Destination	Private Car		Public Transport		Other (cycling walking, etc.)		Several modes	
	A	B	A	B	A	B	A	B
Husband's journey to work	67.2	58.7	17.2	25.4	10.9	10.8	4.7	5.1
Wife's journey to work	47.7	48.1	27.2	30.6	13.6	14.0	11.5	7.3
Sibling 1 (work)	34.6	34.6	38.5	38.4	19.2	20.1	7.7	6.9
Sibling 2 (work)	24.1	28.8	52.1	50.1	23.6	21.0	0.2	0.1
Sibling 3 (work)	69.3	66.7	11.6	12.7	19.0	17.7	0.1	2.9
Social visits 1	68.2	61.4	13.2	10.8	19.2	27.1	0.4	0.7
Social visits 2	53.4	52.7	24.3	24.5	21.5	19.8	0.8	3.0
Social visits 3	49.6	49.1	18.8	26.3	31.0	20.6	0.6	4.0
Social visits 4	30.1	32.9	26.9	33.4	41.8	23.7	1.2	10.0
Social visits 5	13.4	68.4	32.7	8.8	53.9	22.8	----	----
Social visits 6	13.4	65.6	32.7	12.5	53.9	21.9	----	----
Social visits 7	----	57.9	----	23.5	----	20.0	----	3.5
Social visits 8	----	51.2	----	26.1	----	19.3	----	3.4

Table 16

B. FREQUENCY OF TRIPS TO VARIOUS FACILITIES IN 1982 (%)

Destination	Daily	Weekly	Monthly	Other
Primary School	92.9	3.6	3.6	----
Secondary School	87.4	5.3	1.1	6.3
Community College	37.3	30.0	2.5	30.0
University	57.0	26.2	4.7	12.1
Other (educ'l) 1	54.8	25.8	1.6	17.7
2	66.7	33.3	----	----
Park/Play area	32.6	46.0	7.1	14.2
Sports Arena	17.6	51.9	12.2	18.3
Tennis Court	18.7	41.8	15.4	24.2
Bowling Alley	2.0	38.8	18.4	40.8
Golf Course	5.1	34.6	26.9	33.3
Sailing Base	2.4	35.7	23.8	38.1
Swimming Pool	16.9	41.6	16.3	25.3
Race Track	4.0	28.0	24.0	44.0
Provincial Park	1.0	8.6	31.4	59.0
Zoo	----	----	3.3	96.7
Botanical Gardens	2.0	10.8	36.3	51.0
Cottage	1.3	45.2	18.1	35.5
Other (rec'l) 1	3.1	50.0	15.6	31.3
2	6.5	45.2	19.4	29.0
3	5.0	50.0	----	45.0

Destination	Daily	Weekly	Monthly	Other
Restaurant	3.8	42.5	37.8	16.0
Movies	0.3	19.5	49.2	31.0
Theatre	----	6.9	45.0	48.2
Night Club	----	38.6	34.1	27.3
Bingo	4.3	56.5	17.4	21.7
Dancing	----	30.2	34.9	34.9
Other (entm't) 1	8.7	30.4	26.1	34.8
2	13.3	40.0	13.3	33.3
Library	1.1	38.8	39.5	20.5
Church	3.3	73.3	11.4	12.1
Community Centre	4.8	33.7	28.9	32.5
Museum	----	7.0	36.4	56.7
Gallery	----	9.3	31.7	59.7
Concert	----	5.1	41.7	53.2

Destination		Daily	Weekly	Monthly	Other
Clubs	1	3.6	41.6	29.2	25.5
	2	3.0	42.4	24.2	30.3
	3	15.4	23.1	30.8	30.8
	4	----	42.9	28.6	28.6
Family doctor		----	2.9	23.2	73.9
Dental facility		0.3	0.5	7.7	91.5
Pharmacy		0.6	15.6	34.7	49.0
Hospital		1.4	5.6	10.2	82.8
Clinic		----	4.9	14.8	80.8
Other (med'l)	1	4.8	14.3	23.8	57.1
	2	66.7	33.3	----	----

Destination	Daily	Weekly	Monthly	Other
Convenience shops	24.0	54.1	9.9	12.1
Shopping centre	4.0	76.0	11.1	8.9
Bank	1.2	71.2	17.3	10.2
Other (shopping) 1	----	55.2	24.1	20.7
2	2.3	53.5	37.2	7.0
City Hall	5.5	3.3	12.1	79.1
Regional Gov't	3.3	3.3	10.0	83.3
Provincial Ministry	----	6.3	3.1	90.6
Federal Ministry	7.0	8.8	10.5	73.7

Destination	Daily	Weekly	Monthly	Other
Husband's journey to work	90.1	5.0	0.3	4.7
Wife's journey to work	82.5	11.2	0.9	5.4
Sibling 1 (work)	81.7	11.9	0.8	5.6
Sibling 2 (work)	52.8	30.6	----	16.7
Sibling 3 (work)	40.0	----	----	60.0
Social visits 1	9.6	51.0	21.4	17.9
Social visits 2	7.2	37.8	29.7	25.3
Social visits 3	1.8	38.7	27.6	31.9
Social visits 4	5.3	31.6	22.1	41.1
Social visits 5	5.4	19.6	23.2	51.8
Social visits 6	3.2	9.7	32.3	54.8
Social visits 7	6.3	6.3	12.5	75.0
Social visits 8	9.1	18.2	9.1	63.6

Table 17

C. ENERGY USE

1. Total Annual Distance Travelled By Car

	%
No car families	9
Less than 5000 (km)	14
5 000-10 000	23
10 000-15 000	21
15 000-20 000	12
20 000-25 000	5
Over 25 000	16

2. Annual Expenditure on Car per household

Average	$1,692.00

3. Annual Public Transit Expenditure per household

Average	$271.00

4. Average Annual Expenditure per Household, per Energy Source

Electricity	
Average	$380.00
Natural Gas	
Average	$117.00
Oil	
Average	$527.00
Gasoline	
Average	$541.00
Solar	
Average	0

5. Use of Various Types of Energy by Purpose

Purpose		Energy type		(% of use)	
	Electricity	Net gas	Oil	Gasoline	Solar
Space heating	19	17	72	---	1
Water heating	48	14	5	---	---
Battery Warming	15	---	---	---	---
Lighting	100	---	---	---	---
Appliances	70	4	1	4	---
Travel	1	0	4	54	---

Table 18

D. PERSONAL CHARACTERISTICS OF HOUSEHOLD MEMBERS

1. Age

	%
Less than 20	23
20-29	18
30-49	29
50 and older	31

2. Occupation

	%
Student	24
Homemaker	13
Retired/Unemployed	13
White collar, working class	10
Blue collar, working class	13
Professional/Managerial	26
Self employed/owner	2

3. Education

	%
Elementary	15
Some High School	22
Completed High School	23
Community College	4
Some University	5
University degree	28

4. Total Net Income of Household

Less than 10 000	17
10 000 - 20 000	17
20 000 - 30 000	19
Over 30 000	48

GA:mm-6

A2B089

GROUPING OF FACILITIES WITH SIMILAR TRANSPORT MODE REQUIREMENTS

Group 1 (Minimum private car requirement)

Park/Play Area	2.1% by car
Secondary School	16.7
Primary School	18.1
Workplace of youngest Sibling	28.8

Group 2

Family doctor	32.5
Social visit to nearest friend (No 2)	32.9
Community centre	33.7
Workplace of eldest sibling	34.6
Tennis court	35.1
University	35.5
Medical facility 1	36.5
Educational facility 1	39.2

Group 3

Library	41.5
Club/Society 4	42.9
Sports arena	43.0
Convenience Shops	43.5
Community college	43.6
Swimming pool	43.7
Clinic	43.7
Dental facility	44.8
Regional Government	45.2
Provincial Ministry	46.3
Pharmacy	46.8

Group 4

Wife's workplace	48.1
Federal Ministry	49.1
Art Gallery	49.9
Sailing base	50.5
Club/Society 2	51.5
Bank	52.5
Museum	54.4
Botanical Gardens	57.3
Husband's workplace	58.7

Group 5

Social visit to best friend (1)	61.4
Movies outing	62.3
City Hall	64.9
Hospital	64.9
Shopping facility 2	65.1
Bowling alley	65.4
Workplace of 2nd sibling	66.7
Shopping facility 1	67.6

Group 6

Club/Society 3	69.2
Night Club	70.1
Church	70.1
Shopping centre	70.2
Club/Society 1	70.6
Theatre	72.9
Restaurant	74.1

Group 7

Concert	78.6
Zoo	80.3
Provincial park	81.3
Other entm't. facility 1	82.6
Other recr'l. facility 2	82.8
Bingo hall	84.0
Race track	86.2

Group 8 (Maximum car requirement)

Cottage	91.8
Other entm't. facility 2	92.0
Golf course	96.2
Other medical facility 2	98.0

GROUPING OF FACILITIES WITH SIMILAR FREQUENCY OF VISIT REQUIREMENTS

Group 1 (Maximum Frequency of Visits)

Primary school	92.9% daily
Husband's workplace	90.1
Secondary school	87.4
Wife's workplace	82.5
Workplace of eldest sibling	81.7

Group 2

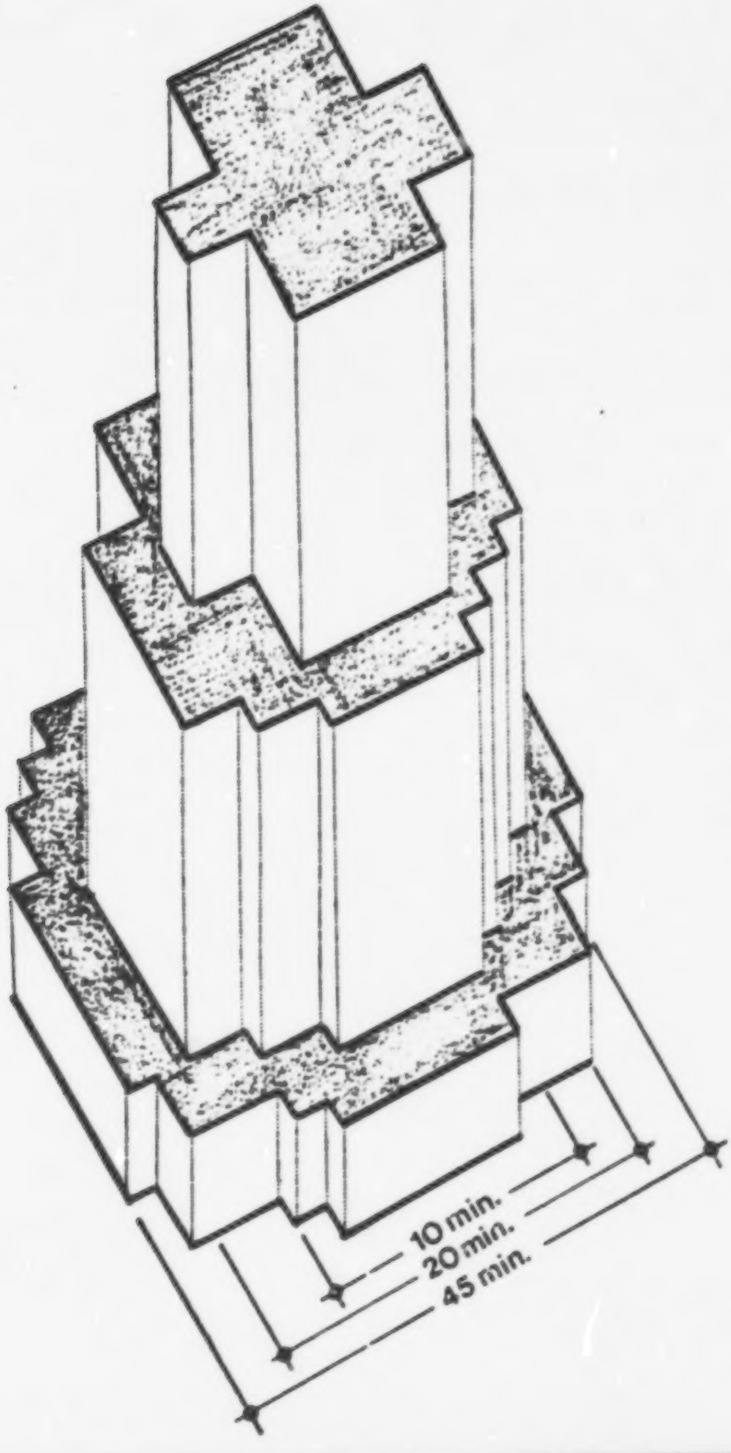
Shopping centre	76.0% weekly
Church	73.3
Community centre	72.0
Bank	71.2
Bingo hall	56.5
Other shopping 1	55.2
Convenience shops	54.1
Other shopping 2	53.5
Sports arena	51.9
Social visit to best friend (1)	51.0
Cottage	45.2
Social visit (2)	37.8
Social visit (3)	38.7
Golf course	34.6

Group 3

Movies	49.2
Theatre	45.0
Concert	41.7
Library	39.5
Restaurant	37.8
Other shopping 2	37.2
Museum	36.4
Botanical Gardens	36.3
Dancing	34.9
Pharmacy	34.7
Night club	34.1
Social visit 6	32.3
Art gallery	31.7
Provincial park	31.4
Club/Society 3	30.8

Group 4 (Minimum frequency of visits)

Museum	56.7% other
Provincial park	59.0
Art gallery	59.7
Workplace of youngest sibling	60.0
Social visits 4-8	63.6 (41.1-63.6)
Federal Ministry	73.7
Family doctor	73.9
City Hall	79.1
Clinic	80.8
Hospital	82.8
Regional Gov't.	83.3
Provincial Ministry	90.6
Dental facility	96.7
Zoo	96.7


10 min.
20 min.
45 min.

DIAG 15 : GENERAL FORM OF A DEMAND CONE; SPECIALISED FACILITY

GROUPING OF FACILITIES WITH SIMILAR DEMAND-CONE REQUIREMENTS, ACCORDING TO TABLE 'C'

Group 1 (Majority of consumers within 2 kms, as indicated by percentage)

Primary school	68.5%	Park/Play area	63.8
Community centre	65.4	Pharmacy	52.1
Convenience stores	65.4		

Group 2 (Majority of consumers within 4 kms)

Library	72.4%	Tennis court	61.2
Club/Society 4	69.5	Sibling 3 workplace	58.0
Bank	67.8	Sports arena	58.7
Secondary school	67.3	Bingo hall	57.1
Church	64.6	Shopping centre	51.2
Swimming pool	62.9	Social visit 1	50.2

Group 3 (Majority of consumers within 7 kms)

Gallery	73.3%	Other (educ'l.)	57.6
University	69.6	Hospital	57.5
Bowling alley	69.3	Other (entm't.) 1	57.1
Regional Gov't.	69.1	Clubs/Societies 1-3 (average)	56.2
Museum	68.8	Dental facility	55.9
Clinic	66.7	Other (medical) 1	55.8
Other (medical) 2	66.6	Night Club	55.6
Restaurant	65.0	Sibling 2 workplace	55.0
Family doctor	64.9	Theatre	54.3
Other (Shopping) 2	63.8	Movies	53.9
Community college	61.0	Wife's workplace	53.6
Botanical gardens	59.5	Sibling 1 workplace	53.1
Other (Shopping) 1	58.7	Social visit 2	52.7
Race track	57.8	Other (educ'l.) 1	52.6
Concert	57.7		

Group 4 (Majority of consumers within 7 kms)

Dancing	71.7%
City Hall	65.5
Other (entn't.) 2	63.4
Husband's workplace	63.0
Social visit 5	61.7
Social visit 4	59.1
Social visit 3	50.3

Group 5: Large catchment facilities (500 - 1000 kms)

Sailing base
Zoo
Theatre
Museum
Hospital
Federal Ministry
Cottage
Other (recr'l.) 1-3
Provincial park
University
Concert Hall
Art gallery
Provincial Ministry
Social visits 6-8
Golf course

GROUPING OF FACILITIES BY COMMON HOURS OF OPERATION

Group 1 (Early morning trip, early afternoon return)

Primary school
Other (educ'l.) 1 (daycare)
Kindergarten
Convenience shops
Secondary school
Community college
University

Group 2 (Morning trip, afternoon return)

Husband's workplace
Siblings' workplaces
Kindergarten
Primary school
Clinic
Wife's workplace
Convenience shopping
Daycare
Other (educational) 2

Group 3 (Lunch-hour trip)

Restaurant
Library
Pharmacy
Convenience shops
Other (shopping) 1
Regional Government
Museum
Gallery
Bank
Shopping centre
Other (shopping) 2
Provincial Ministry

Group 4 (Afternoon trip)

Park/Play area
Sports arena
Tennis court
Library
Golf course
Sailing base
Swimming pool

Group 5 (Evening/"Nite out")

Bowling alley
Restaurant
Movies
Bingo hall
Other (entm't.) 1 & 2
Clubs/societies 1-4
Social visits 1-8
Theatre
Concert
Dancing
Night club
Community centre
Shopping centre
Evening shift workplace

Group 6 (Weekly shopping trip)

Shopping centre
Café/Restaurant
Movies

(Note: Group 6 are the only facilities to afford a commercial rent and social facilities like the library, clinic etc. cannot at present, be located in shopping centres.)

Group 7 (Sunday morning trip)

Church
Sports arena
Cottage (day trip)
Community centre
Cafe/Restaurant

Group 8 (Sunday afternoon trip)

Park/Play area
Tennis court
Bowling alley
Golf course
Swimming pool
Cottage (if near enough for an afternoon trip)
Church
Museum
Art Gallery
Social visits 1-8
Other (recreational) 1-3
Open air festival/ceremony

Provincial park
Zoo (if located in the region)
Botanical gardens
Sailing base
Race track
Community centre
Café/Restaurant
Clubs/Societies 1-4
Hospital (visiting a patient)
City Hall (exhibition area)
Civic Centre (exhibition area)

Group 9 (Sunday evening trip)

Movies
Social visits 1-8
Bowling alley
Restaurant
Church
Community centre

Theatre
Concert
Dancing
Night club
Club/Societies 1-4
Bingo hall

SIGNIFICANT CORRELATIONS* BETWEEN PAIRS OF FACILITIES IN OTTAWA, 1982

---

*NOTE The value of a correlation coefficient in this Table indicates the degree of similarity between two facilities in terms of:

(a) distance travelled by householder;
(b) mode of transport used for access to one or the other;
(c) frequency of visits by users or consumers of their services or merchandise.

The significance of a correlation is assessed by reference to Student's 't' test, which indicates the degree of confidence to be placed on a value. If this value has been calculated on the basis of 100 responses to the Survey for example, the confidence level is 99.9% and the minimum acceptable value is .240.

Abbreviation: Cor'n = Correlation coefficient
Wrkce = Workplace
Gov't = Government

Facility (1)	Cor'n	Facility (2)	Facility (1)	Cor'n	Facility (2)
Clinic	.827	Hospital	Clinic	.683	Restaurant
Prov. Ministry	.743	Hospital	Swimming Pool	.702	University
Museum	.777	Fed. Ministry	Clinic	.891	Dental Facility
Sports Arena	.745	Sibling 1 Wrkce	Concert Hall	.863	Theatre
Bowling Alley	.802	Sibling 2 Wrkce	Night Club	.914	Dancing
Bowling Alley	.920	Sibling 3 Wrkce	Movies	.604	Night Club
Museum	.714	Restaurant	Pro. Park	.883	Restaurant
Clinic	.876	Shopping Cen.	Zoo	.768	Restaurant
Bingo Hall	.951	Restaurant	University	.503	Art Gallery
Family Doctor	.865	Library	University	.708	Museum
Movies	.756	Theatre	Restaurant	.714	Museum
Restaurant	.813	Concert Hall	Restaurant	.651	Theatre
Restaurant	.660	Movies	Restaurant	.684	Night Club
Restaurant	.509	Library	Restaurant	.632	Art Gallery
Restaurant	.518	Hospital	Bowling Alley	.537	Movies
Dancing	.766	Comm. Cen.	Restaurant	.973	Skating (Canal)
Library	.675	Bingo Hall	Library	.672	Tennis Court
Theatre	.492	Comm. Centre	Dancing	.721	Golf Course
Swimming Pool	.416	Comm. Centre	Sports Arena	.752	Sailing
Bowling Alley	.810	Comm. Centre	Sports Arena	.952	Running tr.(Canal)

Tennis Court	.789	University	Bowling Alley	.632	University
Daycare	.823	University	Sports Arena	.706	University
Daycare	.887	Comm. College	Swimming Pool	.753	Sibling 1 Wrkce
Play Area	.694	Comm. College	Tennis Court	.612	Sibling 2 Wrkce
Regional Gov't	.948	Prov. Ministry	Play Area	.605	Sibling 3 Wrkce
City Hall	.684	Fed. Ministry	Comm. College	.672	Sibling 1 Wrkce
City Hall	.690	Prov. Ministry	University	.809	Sibling 1 Wrkce
City Hall	.700	Regional Gov't	Bowling Alley	.778	Sibling 2 Wrkce
City Hall	.680	Bank	Sibling 1 Workplace	.758	Sibling 2 Wrkce
City Hall	.667	Family Doctor	City Hall	.649	Hospital
City Hall	.815	Dental Fac.	Wife's Wrkce	.933	Conv. Shops
City Hall	.795	Pharmacy	Wife's Wrkce	.951	Shopping Centre
City Hall	.733	Clinic	Tennis Court	.943	Clubs/Societies
City Hall	.979	Conv. Shops	Sailing Base	.827	Clubs/Societies
City Hall	.668	Shopping Cen.	Bowling Alley	.987	Cafe/Snack Bar
Husbands Wrkce	.897	Dancing	Museum	.958	Shopping Centre
Wife's Wrkce	.872	Dancing	Comm. College	.851	Theatre
City Hall	.657	Museum	Prov. Ministry	.789	Theatre
City Hall	.745	Art Gallery	Swimming Pool	.751	Comm. College
City Hall	.769	Clubs/Societies	Conv. Shops	.905	Tennis Court

GA:cmm-2
D2D020

PAIRS OF FACILITIES APPEARING IN THE SAME GROUP
IN SEVERAL PRECEDING TABLES

Pairs based on the Primary School

Primary School
Convenience Shops

Primary School
Play area/Park

Primary School
Secondary School

Primary School
Daycare

Primary School
Kindergarten

Primary School
Clinic

Pairs based on the Family Doctor

Family Doctor
Clinic

Family Doctor
Pharmacy

Family Doctor
Dental Facility

Pairs based on the Convenience/Neighbourhood Shops

Convenience Shops
Pharmacy

Convenience Shops
Clinic

Convenience Shops
Wife's workplace

Convenience Shops
Bingo Hall

Convenience Shops
Tennis Court

Convenience Shops
University

Pairs based on the Church

Church
Community Centre

Church
Library

Church
Convenience Shops

Pairs based on the Shopping Centre

Shopping Centre
Restaurant

Shopping Centre
Movies

Shopping Centre
Bank

Shopping Centre
Market

Shopping Centre
Pharmacy

Shopping Centre
Wife's workplace

Shopping Centre
Museum

Shopping Centre
Siblings' Workplace

Shopping Centre
Husband's Workplace

Pairs based on the Restaurant

Restaurant
Movies

Restaurant
Night Club

Restaurant
Golf Course

Restaurant
Museum

Restaurant
University

Restaurant
Art Gallery

Restaurant
Theatre

Restaurant
Bowling Alley

Restaurant
Skating (Canal)

Restaurant
Bingo Hall

Pairs based on Workplace

Husband's Workplace
Wife's Workplace

Husband's Workplace
Siblings' Workplace

Husband's Workplace
Bank

Sports Arena
Siblings' Workplace

Husband's Workplace
Restaurant

Bowling Alley
Silbings' Workplace

Pairs based on the Park/Play Area

Park/Play Area
Tennis Court

Park/Play Area
Swimming Pool

Park/Play Area
Sports Arena

Pairs based on the Cottage

Cottage
Golf Course

Cottage
Sailing Base

Cottage
Skiing resort

Other pairs appearing in more than one preceding Table

Museum
Art Gallery

Sports Arena
Tennis Court

Secondary School
Library

University
Tennis Court

Federal Ministry
Provincial Ministry

Provincial Park
Golf Course

Community Centre
Clubs/Societies

Zoo
Provincial Park

Regional Government
Provincial Ministry

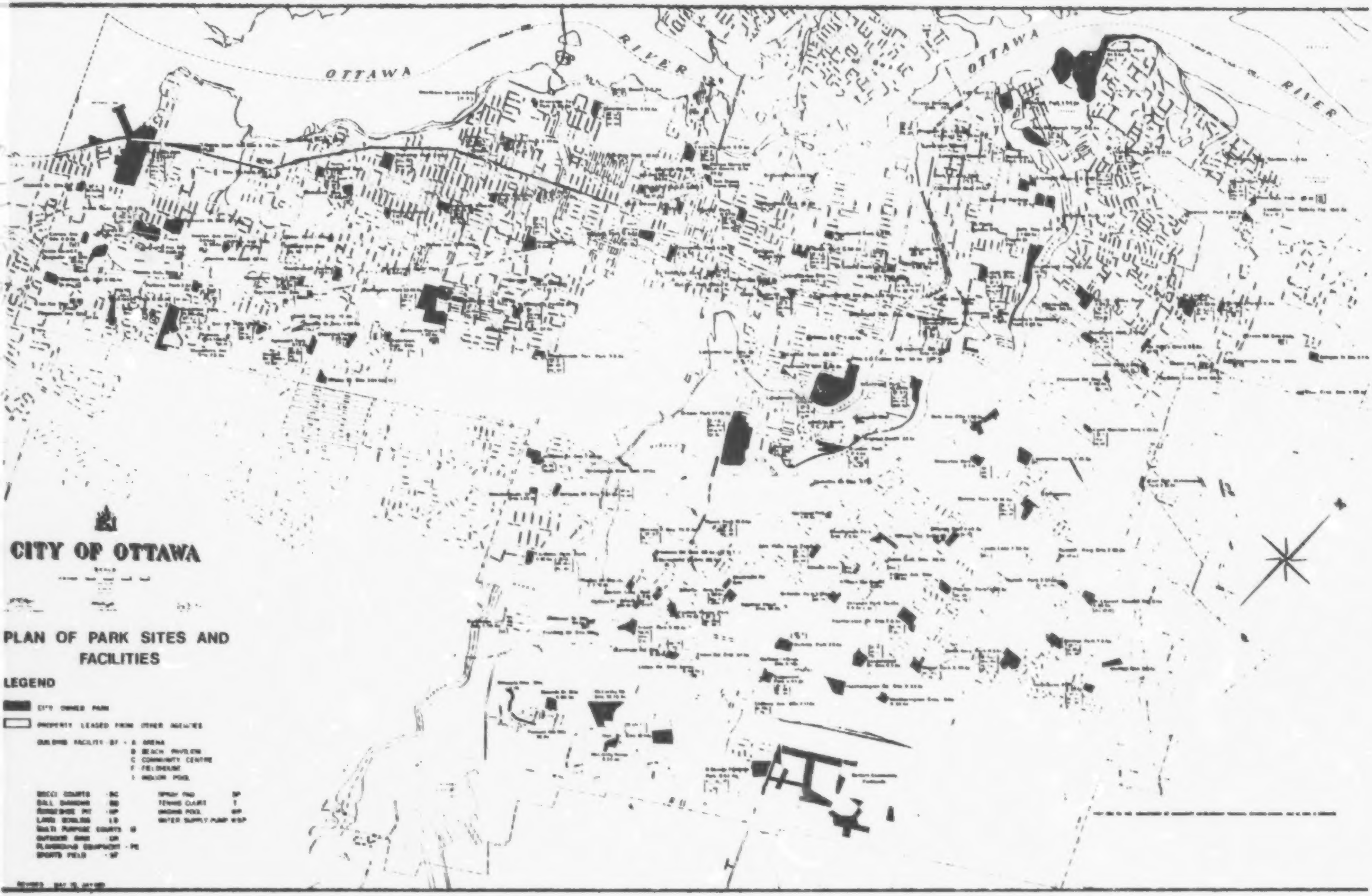
Clinic
Pharmacy

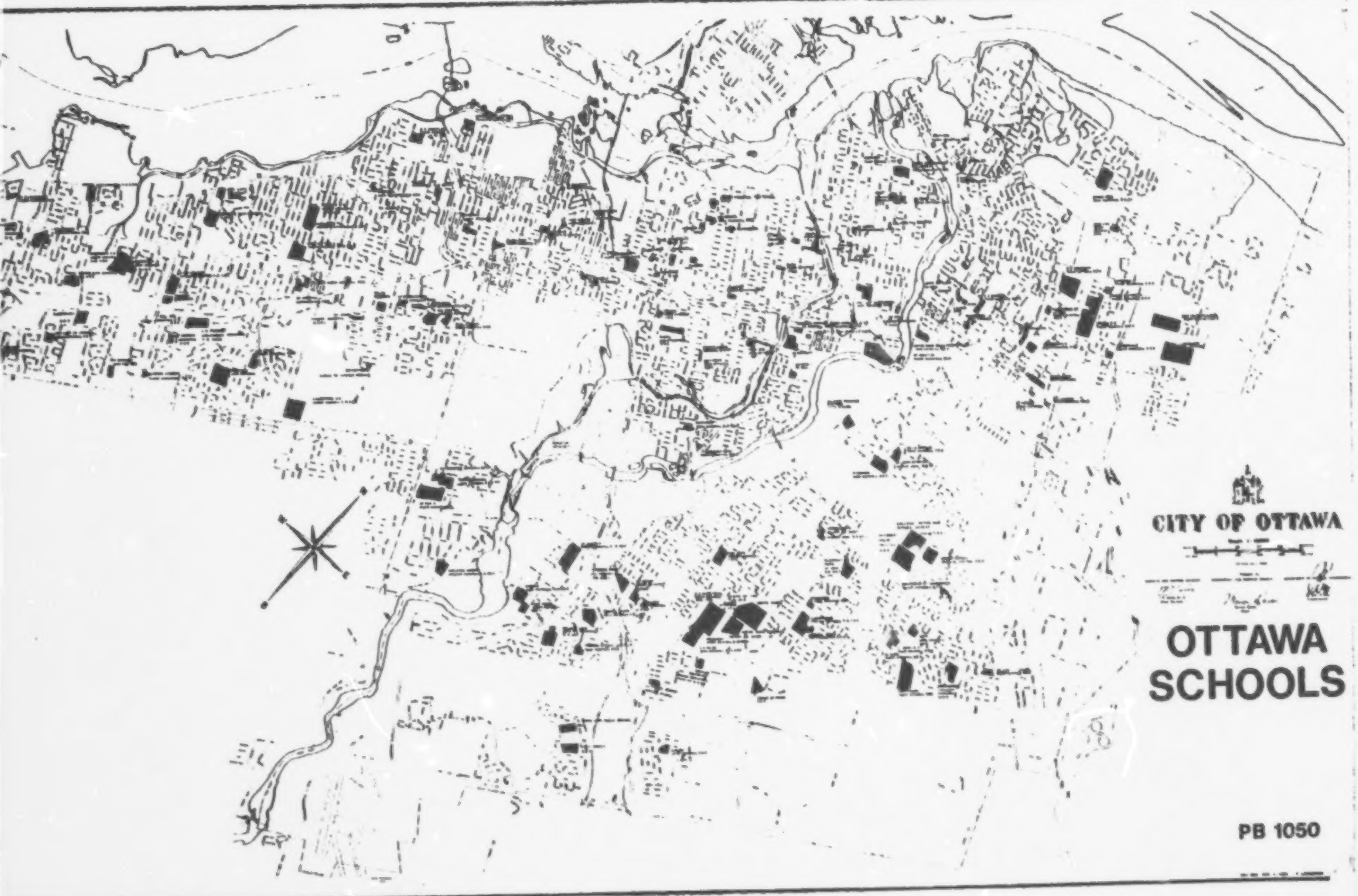
University
Daycare

Night Club
Dancing

GA:cmm-3
A2B093

PB 1110/80

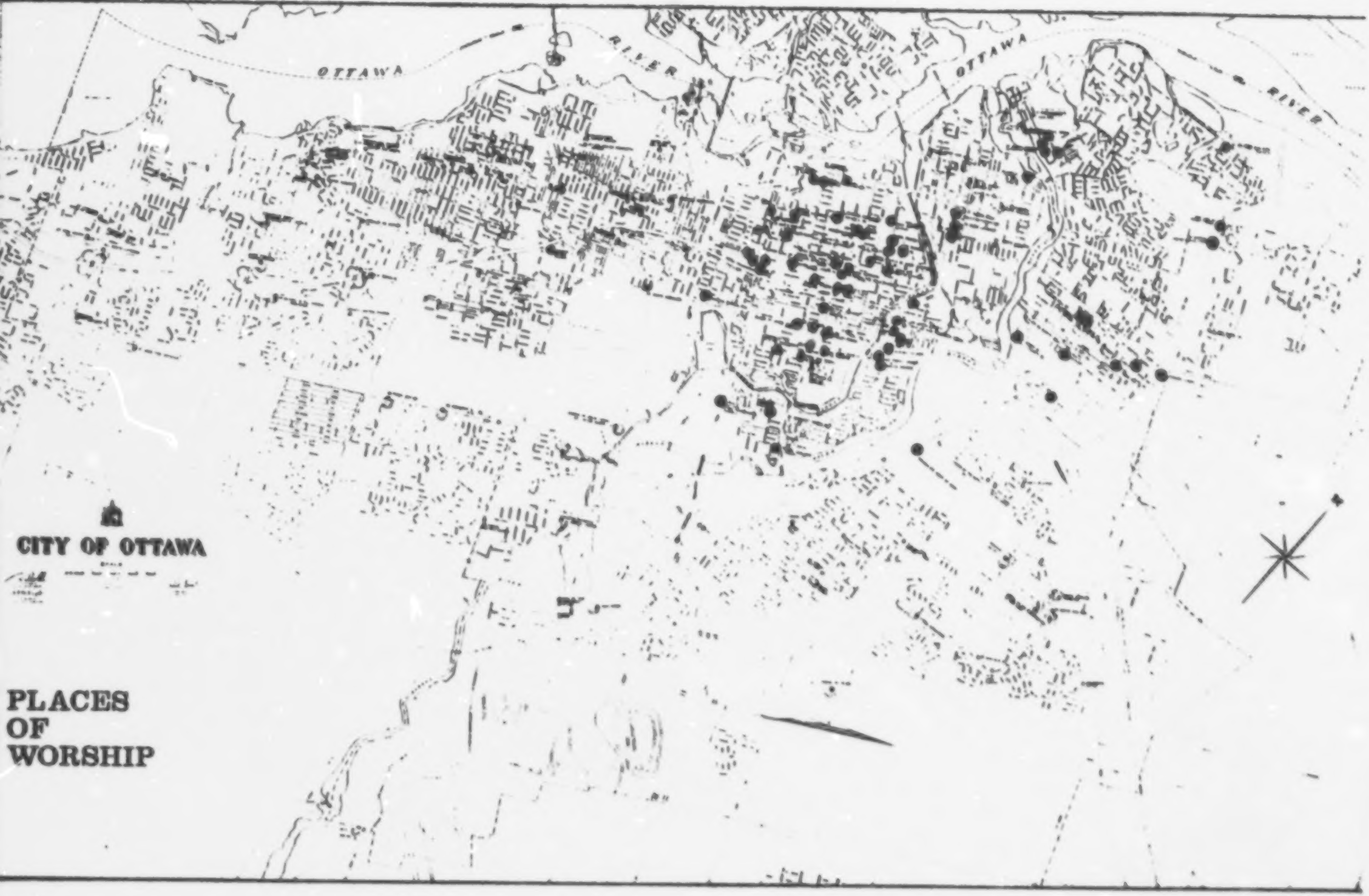

OTTAWA RIVER
OTTAWA RIVER
CITY OF OTTAWA
PLAN OF PARK SITES AND FACILITIES
LEGEND
CITY OWNED PARK
PROPERTY LEASED FROM OTHER AGENCIES
BUILDING FACILITY BY - A ARENA
B BEACH PAVILION
C COMMUNITY CENTRE
F FIELDHOUSE
I INDOOR POOL
BOCCI COURTS - BC
BALL DIAMOND - BD
HORSESHOE PIT - HP
LAWN BOWLING - LB
MULTI PURPOSE COURTS - M
OUTDOOR RINK - OR
PLAYGROUND EQUIPMENT - PE
SPORTS FIELD - SF
SPRAY PAD SP
TENNIS COURT T
WADING POOL WP
WATER SUPPLY PUMP WSP



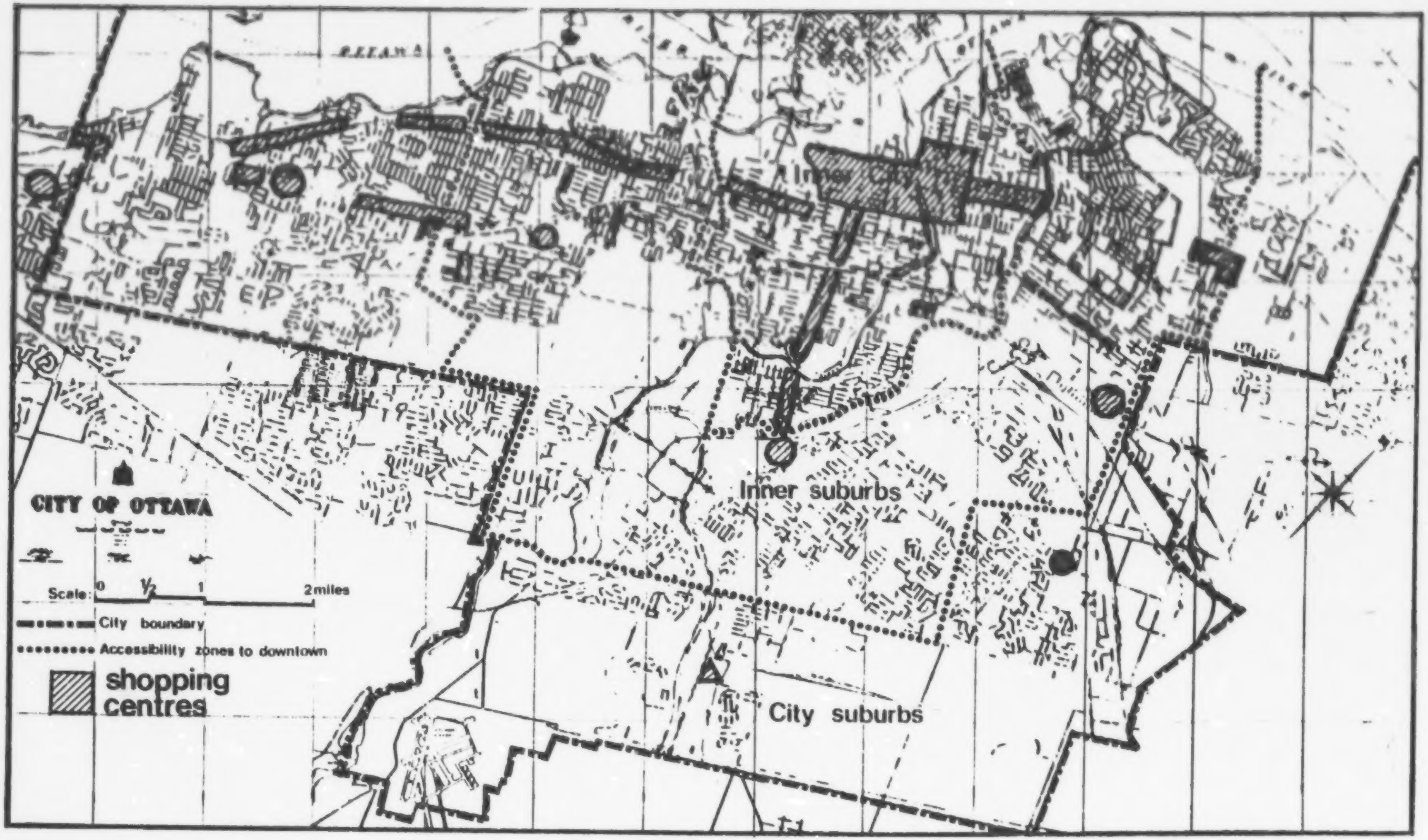
CITY OF OTTAWA

OTTAWA SCHOOLS

PB 1050


PLACES
OF
WORSHIP

CITY OF OTTAWA
OTTAWA
RIVER
OTTAWA
RIVER


OTTAWA
Inner City
Inner suburbs
City suburbs
CITY OF OTTAWA
Scale: 0 1/2 1 2miles
City boundary
Accessibility zones to downtown
shopping centres

APPENDIX 6

TABLES OF ENERGY CONSUMPTION
AND OTHER SOCIO-ECONOMIC CHARACTERISTICS
OF HOUSEHOLDS RESPONDING TO THE
OTTAWA ENERGY BUDGETS GAME

TABLE 14: AVERAGE AGE OF FAMILIES BELONGING TO VARIOUS LIFESTYLE GROUPS, 1983.

CONSERVER LIFESTYLE	GROUPS	AVG. AGE (YRS.)	FRIVOLOUS LIFESTYLE	GROUPS	AVG. AGE (YRS.)
1-person	Inner City	48.18	1-person	Inner City	31.40
2-persons	Inner City	42.57	2-persons	Inner City	39.64
3-persons	Inner City	30.39	3-persons	Inner City	29.44
4-persons	Inner City	24.68	4-persons	Inner City	28.01
5-persons	Inner City	32.91	5-persons	Inner City	N.R.*
6-persons	Inner City	25.17	6-persons	Inner City	18.00
1-person	Inner Suburbs	36.29	1-person	Inner Suburbs	36.25
2-persons	Inner Suburbs	39.28	2-persons	Inner Suburbs	42.02
3-persons	Inner Suburbs	29.89	3-persons	Inner Suburbs	29.67
4-persons	Inner Suburbs	30.13	4-persons	Inner Suburbs	32.33
5-persons	Inner Suburbs	24.04	5-persons	Inner Suburbs	27.31
6-persons	Inner Suburbs	23.58	6-persons	Inner Suburbs	24.88
1-person	City Suburbs	42.92	1-person	City Suburbs	43.67
2-persons	City Suburbs	38.10	2-persons	City Suburbs	35.51
3-persons	City Suburbs	37.98	3-persons	City Suburbs	35.63
4-persons	City Suburbs	29.61	4-persons	City Suburbs	29.25
5-persons	City Suburbs	35.28	5-persons	City Suburbs	32.89
6-persons	City Suburbs	45.50	6-persons	City Suburbs	43.85
AVERAGE		34.25	AVERAGE		32.92

NOTE: *N.R. = Lifestyle group not represented.

TABLE 1 : AVERAGE INCOME PER HOUSEHOLD MEMBER OF VARIOUS LIFESTYLE GROUPS.

CONSERVER LIFESTYLE	GROUPS	AVG. INCOME HSLD. MEMBER	FRIVOLOUS LIFESTYLE	GROUPS	AVG. INCOME HSLD. MEMBER
1-person	Inner City	25,000	1-person	Inner City	18,000
2-persons	Inner City	12,500	2-persons	Inner City	13,350
3-persons	Inner City	12,866	3-persons	Inner City	8,900
4-persons	Inner City	7,150	4-persons	Inner City	8,750
5-persons	Inner City	5,600	5-persons	Inner City	N.R.*
6-persons	Inner City	5,000	6-persons	Inner City	6,667
1-person	Inner Suburbs	33,500	1-person	Inner Suburbs	30,000
2-persons	Inner Suburbs	15,900	2-persons	Inner Suburbs	18,750
3-persons	Inner Suburbs	10,733	3-persons	Inner Suburbs	12,367
4-persons	Inner Suburbs	12,933	4-persons	Inner Suburbs	9,725
5-persons	Inner Suburbs	8,450	5-persons	Inner Suburbs	6,660
6-persons	Inner Suburbs	3,333	6-persons	Inner Suburbs	5,833
1-person	City Suburbs	33,800	1-person	City Suburbs	29,400
2-persons	City Suburbs	17,200	2-persons	City Suburbs	17,500
3-persons	City Suburbs	11,900	3-persons	City Suburbs	8,900
4-persons	City Suburbs	8,250	4-persons	City Suburbs	7,500
5-persons	City Suburbs	6,000	5-persons	City Suburbs	6,500
6-persons	City Suburbs	5,000	6-person	City Suburbs	3,333
AVERAGE		13,062	AVERAGE		12,479

NOTE: *N.R. = Lifestyle group not represented.

TABLE 2: AVERAGE EXPENDITURE ON THE CAR BY FAMILIES IN VARIOUS LIFESTYLE GROUPS, 1983.

CONSERVER LIFESTYLE	GROUPS	AVG. EXP. ($$)	FRIVOLOUS LIFESTYLE	GROUPS	AVG. EXP. ($$)
1-person	Inner City	679.13	1-person	Inner City	903.60
2-persons	Inner City	401.13	2-persons	Inner City	645.11
3-persons	Inner City	505.80	3-persons	Inner City	77.50
4-persons	Inner City	1,327.29	4-persons	Inner City	1,388.50
5-persons	Inner City	1,325.50	5-persons	Inner City	N.R.*
6-persons	Inner City	65.00	6-persons	Inner City	2,500.00
1-person	Inner Suburbs	917.56	1-person	Inner Suburbs	357.00
2-persons	Inner Suburbs	1,015.08	2-persons	Inner Suburbs	2,383.50
3-persons	Inner Suburbs	2,744.56	3-persons	Inner Suburbs	2,093.57
4-persons	Inner Suburbs	826.71	4-persons	Inner Suburbs	2,062.22
5-persons	Inner Suburbs	1,047.63	5-persons	Inner Suburbs	1,010.00
6-persons	Inner Suburbs	1,530.00	6-persons	Inner Suburbs	2,262.50
1-person	City Suburbs	628.63	1-person	City Suburbs	2,047.31
2-persons	City Suburbs	208.63	2-persons	City Suburbs	987.00
3-persons	City Suburbs	1,804.14	3-persons	City Suburbs	927.33
4-persons	City Suburbs	1,042.13	4-persons	City Suburbs	640.44
5-persons	City Suburbs	758.33	5-persons	City Suburbs	1,163.25
6-persons	City Suburbs	787.50	6-persons	City Suburbs	108.00
AVERAGE		978.59	AVERAGE		1,268.08

NOTE: *N.R. = Lifestyle group not represented.

TABLE 3 : AVERAGE 1982 KMILEAGE RUN BY VARIOUS LIFESTYLE GROUPS.

CONSERVER LIFESTYLE	GROUPS	AVG. 1982 KMILEAGE	FRIVOLOUS LIFESTYLE	GROUPS	AVG. 1982 KMILEAGE
1-person	Inner City	5,307	1-person	Inner City	12,283
2-persons	Inner City	4,518	2-persons	Inner City	13,042
3-persons	Inner City	3,535	3-persons	Inner City	12,998
4-persons	Inner City	2,693	4-persons	Inner City	7,681
5-persons	Inner City	8,298	5-persons	Inner City	N.R.*
6-persons	Inner City	8,863	6-persons	Inner City	9,595
1-person	Inner Suburbs	6,762	1-person	Inner Suburbs	14,690
2-persons	Inner Suburbs	5,849	2-persons	Inner Suburbs	16,252
3-persons	Inner Suburbs	6,732	3-persons	Inner Suburbs	18,703
4-persons	Inner Suburbs	7,765	4-persons	Inner Suburbs	19,826
5-persons	Inner Suburbs	8,583	5-persons	Inner Suburbs	17,547
6-persons	Inner Suburbs	9,092	6-persons	Inner Suburbs	16,657
1-person	City Suburbs	7,264	1-person	City Suburbs	17,014
2-persons	City Suburbs	6,799	2-persons	City Suburbs	14,895
3-persons	City Suburbs	7,254	3-persons	City Suburbs	14,676
4-persons	City Suburbs	7,434	4-persons	City Suburbs	10,877
5-persons	City Suburbs	8,668	5-persons	City Suburbs	15,072
6-persons	City Suburbs	9,798	6-persons	City Suburbs	18,099
AVERAGE		6,959	AVERAGE		14,695

NOTE: *N.R. = Lifestyle group not represented.

TABLE 4: AVERAGE 1983-1985 ANNUAL KMILEAGE SIMULATED BY VARIOUS LIFESTYLE GROUPS.

CONSERVER LIFESTYLE	GROUPS	AVG. '83-'85 KMILEAGE	FRIVOLOUS LIFESTYLE	GROUPS	AVG. '83-'85 KMILEAGE
1-person	Inner City	3,998	1-person	Inner City	8,603+
2-persons	Inner City	3,724	2-persons	Inner City	9,223+
3-persons	Inner City	2,200	3-persons	Inner City	9,104+
4-persons	Inner City	2,190	4-persons	Inner City	5,389
5-persons	Inner City	6,198+	5-persons	Inner City	N.R.*
6-persons	Inner City	6,304+	6-persons	Inner City	6,832+
1-person	Inner Suburbs	4,731	1-person	Inner Suburbs	10,281
2-persons	Inner Suburbs	4,102	2-persons	Inner Suburbs	11,389+
3-persons	Inner Suburbs	4,728	3-persons	Inner Suburbs	13,104+
4-persons	Inner Suburbs	5,439	4-persons	Inner Suburbs	13,873
5-persons	Inner Suburbs	6,019	5-persons	Inner Suburbs	11,662+
6-persons	Inner Suburbs	6,365+	6-persons	Inner Suburbs	11,662+
1-person	City Suburbs	5,080	1-person	City Suburbs	11,901
2-persons	City Suburbs	4,763	2-persons	City Suburbs	10,435+
3-persons	City Suburbs	5,072	3-persons	City Suburbs	10,272
4-persons	City Suburbs	5,204	4-persons	City Suburbs	7,685+
5-persons	City Suburbs	6,061	5-persons	City Suburbs	10,563+
6-persons	City Suburbs	6,553	6-persons	City Suburbs	12,601
AVERAGE		4,929	AVERAGE		10,306

NOTE: *N.R. = Lifestyle group not represented.
+Figure exceeding 70% of 1982 kmileage.

TABLE 5 : AVERAGE 1986-1988 ANNUAL KMILEAGE SIMULATED BY VARIOUS LIFESTYLE GROUPS.

CONSERVER LIFESTYLE	GROUPS	AVG. '86-'88 KMILEAGE	FRIVOLOUS LIFESTYLE	GROUPS	AVG. '86-'88 KMILEAGE
1-person	Inner City	1,598+	1-person	Inner City	3,885+
2-persons	Inner City	1,355	2-persons	Inner City	4,216+
3-persons	Inner City	1,083+	3-persons	Inner City	3,951+
4-persons	Inner City	931+	4-persons	Inner City	2,380+
5-persons	Inner City	2,489	5-persons	Inner City	N.R.*
6-persons	Inner City	2,659	6-persons	Inner City	2,870
1-person	Inner Suburbs	2,029	1-person	Inner Suburbs	4,901+
2-persons	Inner Suburbs	1,755	2-persons	Inner Suburbs	4,975
3-persons	Inner Suburbs	2,091+	3-persons	Inner Suburbs	5,750+
4-persons	Inner Suburbs	2,410+	4-persons	Inner Suburbs	5,958+
5-persons	Inner Suburbs	2,575	5-persons	Inner Suburbs	5,010+
6-persons	Inner Suburbs	2,821+	6-persons	Inner Suburbs	5,010+
1-person	City Suburbs	2,179	1-person	City Suburbs	5,162+
2-persons	City Suburbs	2,201+	2-persons	City Suburbs	4,468
3-persons	City Suburbs	2,170	3-persons	City Suburbs	4,400
4-persons	City Suburbs	2,302+	4-persons	City Suburbs	3,298+
5-persons	City Suburbs	2,600	5-persons	City Suburbs	4,601+
6-persons	City Suburbs	2,981+	6-persons	City Suburbs	5,503+
AVERAGE		2,124	AVERAGE		4,499

NOTE: *N.R. = Lifestyle group not represented.
+Figure exceeding 30% of 1982 kmileage.

TABLE 6 : AVERAGE ANNUAL EXPENDITURE ON BUS TRANSPORT BY VARIOUS LIFESTYLE GROUPS, 1982.

CONSERVER LIFESTYLE	GROUPS	AVG. 1982 ($$)	FRIVOLOUS LIFESTYLE	GROUPS	AVG. 1982 ($$)
1-person	Inner City	259.75	1-person	Inner City	100.00
2-persons	Inner City	253.60	2-persons	Inner City	153.50
3-persons	Inner City	23.86	3-persons	Inner City	2.75
4-persons	Inner City	109.86	4-persons	Inner City	228.80
5-persons	Inner City	25.00	5-persons	Inner City	N.R.*
6-persons	Inner City	--	6-persons	Inner City	75.00
1-person	Inner Suburbs	299.92	1-person	Inner Suburbs	113.00
2-persons	Inner Suburbs	116.80	2-persons	Inner Suburbs	214.40
3-persons	Inner Suburbs	85.33	3-persons	Inner Suburbs	56.60
4-persons	Inner Suburbs	23.40	4-persons	Inner Suburbs	168.56
5-persons	Inner Suburbs	280.71	5-persons	Inner Suburbs	201.67
6-persons	Inner Suburbs	425.00	6-persons	Inner Suburbs	194.50
1-person	City Suburbs	439.71	1-person	City Suburbs	146.33
2-persons	City Suburbs	145.13	2-persons	City Suburbs	57.67
3-persons	City Suburbs	385.50	3-persons	City Suburbs	501.50
4-persons	City Suburbs	269.80	4-persons	City Suburbs	202.88
5-persons	City Suburbs	46.17	5-persons	City Suburbs	110.67
6-persons	City Suburbs	--	6-persons	City Suburbs	7.00
AVERAGE		199.34	AVERAGE		149.10

NOTE: *N.R. = Lifestyle group not represented.

TABLE 7 : AVERAGE ANNUAL EXPENDITURE ON ELECTRICITY BY VARIOUS LIFESTYLE GROUPS, 1982

CONSERVER LIFESTYLE	GROUPS	AVG. 1982 ($$)	FRIVOLOUS LIFESTYLE	GROUPS	AVG. 1982 ($$)
1-person	Inner City	1,260.00	1-person	Inner City	427.00
2-persons	Inner City	298.67	2-persons	Inner City	128.25
3-persons	Inner City	490.20	3-persons	Inner City	72.00
4-persons	Inner City	372.57	4-persons	Inner City	4.50
5-persons	Inner City	258.50	5-persons	Inner City	N.R.*
6-persons	Inner City	576.10	6-persons	Inner City	600.00
1-person	Inner Suburbs	440.46	1-person	Inner Suburbs	6.00
2-persons	Inner Suburbs	419.60	2-persons	Inner Suburbs	219.88
3-persons	Inner Suburbs	1,205.63	3-persons	Inner Suburbs	390.67
4-persons	Inner Suburbs	314.86	4-persons	Inner Suburbs	375.71
5-persons	Inner Suburbs	483.50	5-persons	Inner Suburbs	145.33
6-persons	Inner Suburbs	780.00	6-persons	Inner Suburbs	600.00
1-person	City Suburbs	367.88	1-person	City Suburbs	961.53
2-persons	City Suburbs	96.56	2-persons	City Suburbs	237.82
3-persons	City Suburbs	1,908.57	3-persons	City Suburbs	323.00
4-persons	City Suburbs	401.75	4-persons	City Suburbs	175.11
5-persons	City Suburbs	239.33	5-persons	City Suburbs	385.33
6-persons	City Suburbs	447.50	6-persons	City Suburbs	78.00
AVERAGE		575.60	AVERAGE		301.77

NOTE: *N.R. = Lifestyle group not represented.

TABLE 8: AVERAGE EXPENDITURE ON NATURAL GAS BY VARIOUS LIFESTYLE GROUPS, 1982.

CONSERVER LIFESTYLE	GROUPS	AVG. 1982 ($$)	FRIVOLOUS LIFESTYLE	GROUPS	AVG. 1982 ($$)
1-person	Inner City	272.33	1-person	Inner City	--
2-persons	Inner City	--	2-persons	Inner City	5.00
3-persons	Inner City	227.00	3-persons	Inner City	6.50
4-persons	Inner City	353.25	4-persons	Inner City	--
5-persons	Inner City	500.00	5-persons	Inner City	N.R.*
6-persons	Inner City	--	6-persons	Inner City	600.00
1-person	Inner Suburbs	268.00	1-person	Inner Suburbs	14.00
2-persons	Inner Suburbs	1,466.67	2-persons	Inner Suburbs	400.33
3-persons	Inner Suburbs	1,150.00	3-persons	Inner Suburbs	31.50
4-persons	Inner Suburbs	302.33	4-persons	Inner Suburbs	708.17
5-persons	Inner Suburbs	856.00	5-persons	Inner Suburbs	729.00
6-persons	Inner Suburbs	912.00	6-persons	Inner Suburbs	--
1-person	City Suburbs	1,090.40	1-person	City Suburbs	245.40
2-persons	City Suburbs	144.75	2-persons	City Suburbs	245.17
3-persons	City Suburbs	641.50	3-persons	City Suburbs	304.00
4-persons	City Suburbs	352.33	4-persons	City Suburbs	353.25
5-persons	City Suburbs	283.00	5-persons	City Suburbs	3.00
6-persons	City Suburbs	--	6-persons	City Suburbs	--
AVERAGE		587.97	AVERAGE		280.40

NOTE: *N.R. = Lifestyle group not represented.

TABLE 9: AVERAGE ANNUAL EXPENDITURE ON OIL BY VARIOUS LIFESTYLE GROUPS, 1982.

CONSERVER LIFESTYLE	GROUPS	AVG. 1982 ($$)	FRIVOLOUS LIFESTYLE	GROUPS	AVG. 1982 ($$)
1-person	Inner City	622.67	1-person	Inner City	1,256.00
2-persons	Inner City	303.50	2-persons	Inner City	334.00
3-persons	Inner City	84.00	3-persons	Inner City	38.50
4-persons	Inner City	221.50	4-persons	Inner City	6.00
5-persons	Inner City	105.00	5-persons	Inner City	N.R.*
6-persons	Inner City	--	6-persons	Inner City	--
1-person	Inner Suburbs	428.29	1-person	Inner Suburbs	--
2-persons	Inner Suburbs	414.00	2-persons	Inner Suburbs	427.40
3-persons	Inner Suburbs	3,300.00	3-persons	Inner Suburbs	406.00
4-persons	Inner Suburbs	302.75	4-persons	Inner Suburbs	737.33
5-persons	Inner Suburbs	433.60	5-persons	Inner Suburbs	2.00
6-persons	Inner Suburbs	--	6-persons	Inner Suburbs	411.00
1-person	City Suburbs	346.20	1-person	City Suburbs	394.20
2-persons	City Suburbs	20.20	2-persons	City Suburbs	269.67
3-persons	City Suburbs	10.00	3-persons	City Suburbs	330.00
4-persons	City Suburbs	560.00	4-persons	City Suburbs	18.50
5-persons	City Suburbs	213.67	5-persons	City Suburbs	4,952.50
6-persons	City Suburbs	351.50	6-persons	City Suburbs	1.00
AVERAGE		482.30	AVERAGE		638.94

NOTE: *N.R. = Lifestyle group not represented.

TABLE 10: AVERAGE ANNUAL EXPENDITURE ON GASOLINE BY VARIOUS LIFESTYLE GROUPS, 1983.

CONSERVER LIFESTYLE	GROUPS	AVG. 1982 ($$)	FRIVOLOUS LIFESTYLE	GROUPS	AVG. 1982 ($$)
1-person	Inner City	229.83	1-person	Inner City	833.67
2-persons	Inner City	200.40	2-persons	Inner City	442.75
3-persons	Inner City	366.60	3-persons	Inner City	159.00
4-persons	Inner City	658.83	4-persons	Inner City	1,562.50
5-persons	Inner City	600.50	5-persons	Inner City	N.R.*
6-persons	Inner City	--	6-persons	Inner City	1,250.00
1-person	Inner Suburbs	221.56	1-person	Inner Suburbs	9.67
2-persons	Inner Suburbs	484.89	2-persons	Inner Suburbs	1,417.00
3-persons	Inner Suburbs	1,272.13	3-persons	Inner Suburbs	1,228.86
4-persons	Inner Suburbs	304.83	4-persons	Inner Suburbs	1,410.17
5-persons	Inner Suburbs	387.33	5-persons	Inner Suburbs	676.67
6-persons	Inner Suburbs	450.00	6-persons	Inner Suburbs	606.00
1-person	City Suburbs	775.14	1-person	City Suburbs	1,637.73
2-persons	City Suburbs	111.75	2-persons	City Suburbs	282.22
3-persons	City Suburbs	1,333.75	3-persons	City Suburbs	686.80
4-persons	City Suburbs	525.00	4-persons	City Suburbs	385.43
5-persons	City Suburbs	556.60	5-persons	City Suburbs	741.25
6-persons	City Suburbs	--	6-persons	City Suburbs	112.00
AVERAGE		529.94	AVERAGE		790.68

NOTE: *N.R. = Lifestyle group not represented.

TABLE 11 : AVERAGE ANNUAL EXPENDITURE ON SOLAR HEATING BY VARIOUS LIFESTYLE GROUPS, 1983.

CONSERVER LIFESTYLE	GROUPS	AVG. 1982 ($$)	FRIVOLOUS LIFESTYLE	GROUPS	AVG. 1982 ($$)
1-person	Inner City	--	1-person	Inner City	--
2-persons	Inner City	7.00	2-persons	Inner City	--
3-persons	Inner City	--	3-persons	Inner City	--
4-persons	Inner City	--	4-persons	Inner City	--
5-persons	Inner City	--	5-persons	Inner City	N.R.*
6-persons	Inner City	--	6-persons	Inner City	--
1-person	Inner Suburbs	--	1-person	Inner Suburbs	--
2-persons	Inner Suburbs	300.00	2-persons	Inner Suburbs	--
3-persons	Inner Suburbs	--	3-persons	Inner Suburbs	300.00
4-persons	Inner Suburbs	--	4-persons	Inner Suburbs	--
5-persons	Inner Suburbs	1.00	5-persons	Inner Suburbs	--
6-persons	Inner Suburbs	--	6-persons	Inner Suburbs	--
1-person	City Suburbs	--	1-person	City Suburbs	--
2-persons	City Suburbs	--	2-persons	City Suburbs	--
3-persons	City Suburbs	--	3-persons	City Suburbs	--
4-persons	City Suburbs	--	4-persons	City Suburbs	--
5-persons	City Suburbs	--	5-persons	City Suburbs	6.00
6-persons	City Suburbs	--	6-persons	City Suburbs	--
AVERAGE		154.00	AVERAGE		102.00

NOTE: *N.R. = Lifestyle group not represented.

TABLE 12: SUMMARY* OF AVERAGE AGE AND EXPENDITURE CHARACTERISTICS OF OTTAWA LIFESTYLES, 1983-1992.

AVG. CHARACTERISTIC OR EXPENDITURE RELATED TO ENERGY	CONSERVER LIFESTYLES (18 GROUPS)	FRIVOLOUS LIFESTYLES (18 GROUPS)
Age (1983)	34.25 years	32.92 years
Income (1983)	$13,062	$12,479
Car Expenditure		
(1983)	$978.59	$1,268.08
(1988)	$1,657.00	$4,317.00
Annual Kmileage Run		
(1982)	6,959 kms	14,695 kms
(1983-85)	4,929 kms	10,306 kms
(1986-88)	2,124 kms	4,499 kms
Bus Transport		
(1982)	$199.34	$149.10
(1983-85)	342.00	289.00
(1986-88)	513.00	472.00
(1989-92)	834.00	703.00
Hydro Electricity (1982)	$575.60	$301.77
Natural Gas (1982)	$587.97	$280.40
Oil (1982)	$482.30	$638.94
Gasoline (1982)	$529.94	$790.68
Solar Heating (1982)	$154.00	$102.00
Relative Percentage of City Population in:-		
(1982)	55%	45%
(1985)	66%	34%
(1988)	70%	30%
(1992)	72%	28%

* Summary of Tables 14 to 25 in APPENDICES volume.

GA:cmm-2
D2D107

APPENDIX 7

ANNOTATED BIBLIOGRAPHY

BIBLIOGRAPHY

ENERGY USE AND LAND USE PATTERNS

ALBUS James S; (1983): ROBOTS IN THE WORKPLACE

Article in The Futurist, Vol. XV, No. 3 (June 1983) pp 22-27.

Defines 'Robot', predicts number to be produced by 2000 A.D. (i.e., 60,000 per annum) and their impact on mechanical assembly. Believes that a variety of alternative occupations will be created to fill the void by jobs taken over. "We need to develop renewable energies, clean up the environment, rebuild our cities, exploit oceans and explore space."

ALCOCK. N.L.; KOSNY, M.E.; (1983): THE CONSERVER PHILOSOPHY: Theory into Practice at the Local Level

Occasional Paper, Ryerson Polytechnic, Toronto.

Explores the rationale for conserver-oriented planning and provides detail about a number of innovative experiments in U.S A.

ALLEN, E.H.; (1975): HANDBOOK OF ENERGY POLICY FOR LOCAL GOVERNMENT

Lexington Books, Lexinngton, Mass.

AMERICAN INSTITUTE OF PLANNERS; (1976): WASHINGTON D.C. PUT ENERGY IN YOUR PLANNING: A How-to Guide for Community Planners

Proceedings from the N.E. Regional Conference, Hyannis, Mass June 14-16.

ARMEN, G.; (1971): SERVICE FUNCTIONS AND URBAN CHARACTER: A Systems Approach to the Growth and Distribution of Services with Application to the Planning of New Communities

University of Reading (Ph.D. Thesis). Published as a monograph by the Department of the Environment, London.

ARMEN, G.; (1972): A CLASSIFICATION OF CITIES AND CITY REGIONS IN ENGLAND AND WALES, 1966

In *Regional Studies*, June 1972 issue, pp 149-182.

ARMEN, G.; (1976): THE PROGRAMMING OR SOCIAL PROVISION IN NEW COMMUNITIES

Series of articles in the *Town Planning Review*; April and July 1976 issues.

ARMEN, G.; (1977): THE ANALYSIS OF INTERACTIONS AND RESOLUTION OF CONFLICTS IN PLANNING OBJECTIVES AND POLICIES

Contact, Spring 1977 issue, pp 10-32.

ARMEN, G; (1982): ENERGY AND LAND USE PATTERNS IN THE CITY

A lifestyles approach to the planning of land-use patterns for the energy-tight 1980's in *Prospect for Planning* (proceedings of CIP Annual Conference, ed. by B. Waller), pp 142 gives a new definition of NETWORKING.

ARMOUR, A; (1980): REPORT ON THE PROCEEDINGS OF THE CITIES ENERGY CONFERENCE

Queen's Park, Government of Ontario.

ARNSTEIN, Sherry; (1969): "EIGHT RUNGS ON THE LADDER OF CITIZEN PARTICIPATION"

Article in *The Journal of the American Institute of Planners, Vol. 34, No. 4, July 1969, pp* 216-224

BARKER, W.G.; (1975):
FORECASTING URBAN TRANSPORTATION ENERGY CONSUMPTION

North Centreal Texas Council of Governments, Arlington, Texas, April 1975.

BECKMANN, M; MARSCHAK, T.; (1955):
AN ACTIVITY ANALYSIS APPROACH TO LOCATION THEORY

in KYKLOS 8, pp 125-143.

BEER, S; (1967):
MANAGEMENT SCIENCE

Aldens Books, London.

Concept of model, Cones of resolution, Self-regulating properties, Cybernetics, Hierarchical networker, Federa management.

BELL, C.; (1971):
A SOCIOLOGICAL PORTRAIT: MARRIAGE

in New Society, 11.11.71, pp 932 935.

BORKMAN, H.G.; (1965):
GAME THEORY OF LAND USE DETERMINATION

Land Economics 41/7

BOLIN, Bert; (1975):
ENERGY AND CLIMATE

Secretariat for Future Studies, Stockholm.

BERRY, B.J.H.; (1967)A:
GROUPING AND REGIONALIZING

Article in Quantitative Geography (edited by W.L. Garrison and D.F. Marble)

Proposes a method for grouping multivariate observations by Factor Analysis and Distance Sealing of similarities. Explains various methods of Grouping Analysis and illustrates "Bonded Groups' by means of a set of 34 centres described in 36 service characteristics. The second most important factor is identified as 'highway-orientation'. Centres are classified as 'Neighbourhood Nucleations', 'Streetcorner Nucleations' and 'Small Highway Oriented Districts', while services or business types are divided into 'High Order Nucleated' and 'Urban Arterial'.

BOWYER, E. et al; (1982): GUIDELINES FOR DEVELOPING A MUNICIPAL ENERGY POLICY

York University (Policy 501 course)

Municipal powers, Federal and Provincial policies, Current municipal policies, Public participation, Summary.

BURRMELL, R W.; LISTOKIN, D.; (1975): LAND USE: ENERGY, ENVIRONMENTAL AND LEGAL CONSTRAINTS

Rutgens University N.B

BUREAU OF MUNICIPAL RESEARCH; (1978): WHAT CAN MUNICIPALITIES DO ABOUT ENERGY?

BMR, Toronto, 47 pp, $2.00.

After stressing the importance of their role, examines four areas for action by municipalities: 1. Land use and transportation; 2. Building and site design regulations; 3. Development of local renewable energy sources; and 4. Public education and demonstration programmes.

CARRIER, Roger; (1975): ENERGY CONSERVATION THROUGH URBAN TRANSPORTATION PLANNING - Final Report

Pennsylvania Transport's Institute, Pennsylvania, University Park.

CARROL, T.; Owen et al; 1977: PLANNER'S ENERGY WORKBOOK: A Manual for Exploring Relationships Between Land Use and Energy Utilization

Bracklaren National Laboratory, Energy Policy Analysis Group, New York.

CATTELL, R B ; (1952): FACTOR ANALYSIS
Harper and Brothers, New York

CHAPIN, J.R.; KAISER, E.J.; (1979): URBAN LAND USE PLANNING
Champaign, University of Illinois.

CHIBUK, John; (1977): ENERGY AND URBAN FORM
Ministry of State for Urban Affairs, Ottawa.

CLAWSON, M.; (1959): METHODS OF MEASURING THE DEMAND FOR AND VALUE OF OUTDOOR RECREATION
Resources for the Future Inc., Reprint No. 10, Washington, D.C.

CONWAY, Chris et al; (1979): ENERGY PLANNING IN A CONSERVER SOCIETY: IMPLEMENTATION STRATEGIES
Energy Probe, Toronto.

COOLEY, Nancy J.; (1979): THE BRITANNIA COMMUNITY SERVICES CENTRE: A Lesson in Participatory Planning and Design.
in Urban and Regional Planning in a Federal State (Perks and Robinson) pp 330-343, LHT 169-C3U719.

COUNCIL ON ECONOMIC PRIORITIES; (1980): JOBS AND ENERGY: The Economic and Employment Impacts of Nuclear Power, Conservation and Other Energy Options
New York, N.Y.

CITY OF VANCOUVER; 1979: A FRAMEWORK FOR A VANCOUVER ENERGY POLICY
in Quarterly Review of the City of Vancouver, issue of Oct. 1979.

Addresses seven policy areas: the city role, existing homes, sharing the energy burden, redevelopment as conserver city, encouraging innovation, transportation efficiency, conservation in city operations. Basis for community debate leading to strategy.

CLUB OF ROME; (1982): (Edited by J.M. Richardson)
MAKING IT HAPPEN - A Positive Guide to the Future

U.S. Association for the Club of Rome, Washington D.C.

Personal transformation is an essential key to solving the crisis problematique. The problem is not only 'out there', *it is in us*. We must *be* the change we desire. Through commitment of each of *us, chaos could* be avoided. "How to stop ovegrowth and destruction" in projects and ideas.

COMMONER, Barry, (1971):
THE CLOSING CIRCLE

Alfred Knopf, N.Y.

COTTRELL, Fred; (1955):
ENERGY AND SOCIETY: The Relation Between Energy Social Change and Economic Development

McGraw Hill, N.Y.

CRONE, R.B.; (1982):
THE CLIMATE OF OTTAWA-HULL

The Climate of Canadian Cities series, Environment Canada, Toronto.

CURTIS, Fred; (Ed); 1979:
CONSIDERATIONS AND OPPORTUNITIES FOR ENERGY CONSERVATION IN URBAN AND REGIONAL PLANNING

Conference proceedings, March 9-11, Kingston, Ontario, Queen's Univ., School of Urban and Regional Planning.

CURTIS, F.; et al; (1983):
A RECIPE FOR ENERGY CONSERVATION THROUGH LAND USE PLANNING

in *Sunfest '83* Conference proceedings, SESCI, Winnipeg.

1. Municipalities should find out the effectiveness of various land use measures. 2. They should be given the authority to implement these policies. 3. They must be willing and motivated to take initiatives. 4. They must have the resources and government support to do all this.

DESFOR, Gene et al; (1979): ANALYSIS OF THE RELATIONSHIP BETWEEN URBAN FORM AND ENERGY CONSUMPTION

Ottawa, Ministry of State for Urban Affairs.

DEUDNEY, D.; FLAVIN, C.; (1983): RENEWABLE ENERGY: THE POWER TO CHOOSE

W. N. Nerton, N.Y.

Account of the latest advances in renewables including photovolaties. Provides plan of action to promote a sound energy growth in rich and poor nations.

DEWER, M.; (1965): FOURTH WAVE: THE CHALLENGE OF LEISURE

in Architects Journal, 20.1, 1965.

DUKE, R.L.; (1964): GAMING-SIMULATION AND URBAN RESEARCH

Michigan State University, East Lansing, Mich.

DUMAZEDIER, J.; (1967): TOWARD A SOCIETY OF LEISURE

Collier MacMillan, London.

DUNCAN-MITCHELL, G. et al; (1954): NEIGHBOURHOOD AND COMMUNITY

Liverpool University Press.

EDER, Peter F.; (1983): TELECOMMUTERS: The Stay-at-Home Work Force of the Future

(article in The Futurist, Vol. XVII, No. 3 (June '83) pp 30-35).

Mentions advantages and disadvantages of working at home and concludes that it will evolve at a pace determined by a host of interrelated factors, including the availability of energy. "Society must adjsut to and accept changing roles and modes of living".

(Editor) EKISTICS; (1978): THE IMPACT OF ENERGY CONSIDERATIONS ON THE PLANNING AND DEVELOPMENT OF HUMAN SETTLEMENTS

Ekistics, May 1979 issue.

ENERGY, MINES AND RESOURCES; (1976): AN ENERGY STRATEGY FOR CANADA: POLICIES FOR SELF-RELIANCE

Supply and Services Canada, Ottawa.

ENERGY, MINES AND RESOURCES; (1981): MUNICIPAL ENERGY AUDIT: A Practical Guide to the Identification of Energy Expenditures

Ottawa.

ETZIONI, AMITAI; (1980): CHOOSE AMERICA MUST

in *Across the Board*, October 1980 issue.

FELS, M.F.; MUNSON, M.J.; (1975): ENERGY THRIFT IN URBAN TRANSPORTATION: Options for the Future

Energy Conservation Papers, pp 7-104 Ballinger Publishing Co., Cambridge, Mass.

FERGUSON, Marilyn; (1980): THE AQUARIAN CONSPIRACY: Social Transformation in the 1980'S

Tarcher, L.A.

FISCHER, C.L. et al; (1977): NETWORKS AND PLACES: Social Relations in the Urban Setting

The Free Press, N.Y.

FORD FOUNDATION; (1979): ENERGY: THE NEXT TWENTY YEARS

Ballinger Publishing Co.,
Cambridge, Mass. (628 pp).

FREEMAN, S.D.; (1975): THE MULTIPLE DIMENSIONS OF ENERGY POLICY

(an article Land Use: Energy, Environmental and Legal Constraints pp 305-309) (Burchell and Listokin, eds.), Rutens University, N.B.

FRUCHTER, B.; (1954): INTRODUCTION TO FACTOR ANALYSIS

Van Nestrand, New York.

GAHBOUER, S.F.; (Undated): DISTRICT HEATING IN THREE NORDIC COUNTRIES: ·WHAT CAN ONTARIO LEARN?

Ministry of Energy, Toronto.

GANDERS, J.E. et al; (1978): ENERGY FUTURES FOR CANADIANS

Energy, Mines and Resources, Supply and Services, Ottawa.

GIBSON, Judith; (1979): LOCAL ENERGY INITIATIVES IN CANADIAN URBAN SETTLEMENTS

CMHC, Montreal Road, Ottawa K1A 0P7

Energy-related projects in 50 case studies.

GOLDBERG M. et al; (1980): ZONING: ITS COST AND RELEVANCE FOR THE 1980's

Fraser Institute, Vancouver.

See review in Section 1. Ottawa Public Library: 352.961 G618.

GOTTMAN, Jean; (1972): URBAN CENTRALITY AND THE INTERWEAVING OF QUATERNARY ACTIVITIES

Ekisties 174, pp 322-32; also in *Human Identity in the Urban Environment* (ed. G. Bell and J. Tyrwhitt), Pelican, 1972.

While the centrality of the city may be questioned, very fundamental linkages between quaternary activities are expanding the centes of some large conurbations. Managerial and professional occupations are 13% of the labour in England and Wales, 15% in France, 10% in Switzerland, 12% in Netherlands, 17.5% in Sweden, 21% in Canada, 21.8% in USA. Transactional activity and competition strengthens the coherence of the urban system. The factors of interweaving are classified as: Accessibility (train, car, airplane); information flows requiring physical presence; Transactional performance factors; Labour market; Amenities and entertainment; Expert consultation; Money market; Shopping facilities; Educational facilities.

HARRINGTON, Winston; (1976): ENERGY CONSERVATION: A NEW FUNCTION FOR LOCAL GOVERNMENTS

Chapel Hill, N.C. University of North Carolina, Centre for Urban and Regional Studies.

HARWOOD, C.C.; (1977): USING LAND TO SAVE ENERGY

Ballinger Publishing, Cambridge, Mass.

HARVEY, D.; (1970): SOCIAL PROCESS AND SPATIAL FORM

in *Papers of the Regional Science Assocition*, Vol. 25.

Provides a summary of the discussion between the environmental determinists, those who believe that spatial form has an influence on social behaviour, and the social determinists, those who believe that social process possesses its own dynamic. Calls for a new language common to spatial form and social process.

HEALY, T.J.S.; (1976): ENERGY AND SOCIETY

Boyd and Fraser Pub. Co., San Francisco. MD 9502, AZ M4 1976.

HEMMENS, G.C.; (1966):
AN ANALYSIS OF UBAN TRAVEL AND THE SPATIAL STRUCTURE OF URBAN ACTIVITIES

Unpublished Ph.D thesis. MIT Department of Urban Studies.

HEMPHILL, M.; (1980):
PORTLAND OREGON'S APPROACH TO ENERGY ANDD LAND USE

City of Portland (p. 127).

HITTMAN ASSOCIATION; (1978):
COMPREHENSIVE COMMUNITY ENERGY PLANNING: A WORKSHOP (3 volumes)

U.S. Department of Energy, Washington, D.C.

HIX, John; (1977):
ENERGY DEMAND FOR FUTURE AND EXISTING LAND USE PATTERNS

Royal Commission on Electric Power Planning, Toronto.

HOINVILLE, G.; (1971):
EVALUATING COMMUNITY PREFERENCES

Environment and Planning #3, (pp 33-50).

Use of iconogaphic and physical simulation to permit respondents to make meaningful ordered choices among the imagined environments.

HOUSE, P.W.; KILLIANS, E.R.; (1977):
PLANNING AND CONSERVATION: THE EMERGENCE OF THE FRUGAL SOOCIETY

Praegen Publishers, N.Y.

HUBBERT, M. King; (1971):
THE ENERGY RESOURCES OF THE EARTH

in Scientific American, Vol. 224.

HUNT, Allan and Tim; (1983): HUMAN RESOURCE IMPLICATIONS OF ROBOTICS

W.E. Upjohn Institute of Employment Research, Washington, D.C.

Explanation of job creation and displacement potential of robotics or the assumption of evolutionary rather than revolutionary change. Concludes that robots wiill destroy unskilled jobs but create skilled ones.

HUBBARD, B.M.; (1983): THE FUTURE OF FUTURISM

article in The Futurist, Vol. XVII, No. 2, (April 1983), pp 52-58.

Threats to survival may be growing but human potential is also growing exponentially.

JACKSON, C.I. (Ed); (1978): HUMAN SETTLEMENTS AND ENERGY

Pergamon of Canada Ltd., Toronto.

JAMIESON, Alex; (1980): ENERGY AND THE MUNICIPAL PLANNER

Vancouver, B.C.

IBI GROUP; (1976): ENERGY CONSERVATION THRU' LAND-USE DECISIONS

Environment Canada, March '76, Ottawa.

INSTITUTE OFF REAL ESTATE MANAGEMENT; ENERGY COST REDUCTION FOR APARTMENT (1977) OWNERS AND MANAGERS

Chicago, Illinois.

KEYES, D.L.; (1976): ENERGY AND LAND USE: An Instrument of U.S. Conservation Policy?

in Energy Policy, Vol. 4, No. 3, pp 225-236.

KNOWLES, R.L.; (1974):
ENERGY AND FORM: AN ECOLOGICAL APPROACH TO URBAN GROWTH

MIT Press, Cambridge, Mass.

KOTLER, M.; (1969):
NEIGHBOURHOOD GOVERNMENT

Bobbs-Merrill Co. Inc.,
Indianapolis, Ind.

Detailed discussion of neighbourhood to arrive at a political definition.

LANG, R.; AMOUR, A.; (1980):
NEW DIRECTIONS IN MUNICIPAL ENERGY CONSERVATION: The California Experience

Ministry of Energy Toronto.

LINDER, S.B.; (1970):
THE MARRIED LEISURE CLASS

Columbia University Press, N.Y. USA.

Systematically lampoons the reality of free timme, bringing out that in a consumer oriented culture people in middle income circumstances or above become captives of their "free time". As income goes up, more time is tied up in consumption and maintenance - if one buys a vacation house, one feels obliged to maintain it in all seasons.

LIPTON, Michael; (1977):
WHY POOR PEOPLE STAY POOR: URBAN BIAS IN WORLD DEVELOPMENT

Harvard University Press,
Cambridge, Mass.

LITWAK, E,; (1961):
VOLUNTARY ASSOCIATION AND NEIGHBOURHOOD COHESION

Americal Sociological Review 26,
pp 258-71.

Despite national orientations, *local* identification was still important. Geographical and social mobility do not necessarily preclude local commitment.

Voluntary association was still factor of cohesion. Established cycle of gradual cohesion 1. Settling in period - all effort to adjusting; 2. Some participation and development of personal relationships; 3. Primary relationships firmly established and participation is more selective. Familiar with no positive neighbourhood oorientation. Participation in formal association is the substitute. Only the upward mobile have negative attitude to neighbourhood cohesion.

LÖNROTH, M.; (1976): SWEDISH ENERGY POLICY TECHNOLOGY IN THE POLITICAL PROCESS

Secretariat for Future Studies, Stockholm.

LOVINS, Amory B.; (1976): ENERGY STRATEGY
The Road Not Taken?

Foreign Affairs, London, UK.

LOVINS, AMORY B.; (1976A): SCALE, CENTRALIZATION AND ELECTRIFICATION IN ENERGY SYSTEMS

Friends of the Earth Inc., London, UK.

MASSACHUSETTS AUDUBON SOCIETY; (1982): THE ENERGY SAVER'S HANDBOOK FOR TOWN AND CITY PEOPLE

Rodale Press, Emmaus, Pa.

McCARTHY, M.; HOOK, J; KIOS, D; (1956): THE MEASUREMENT OF ASSOCIATOIN IN INDUSTRIAL GEOGRAPHY

State University of Iowa, Department of Geography, Report 1.

Proposed an indirect method of establishing the association between groups of industries. This has been adopted for purposes of this study and it is discussed in greater detail in paragraph 2.9 (Section 3).

MINISTRY OF ENERGY; (1981): ALTERNATE ENERGY SUPPLIES AND TECHNOLOGIES AND THEIR IMPLICATIONS FOR LAND USE PLANNING

(Enerplan Consultants and ECE Group) Toronto.

MINISTRY OF ENERGY; (1981): ANNUAL REPORT OF THE MINISTRY OF ENERGY FOR THE YEAR ENDED MARCH 31, 1981

Government of Ontario, 1981 (pp 4 and 5).

MITCHELL, Arnold; (1983): THE NINE AMERICAN LIFESTYLES: WHO ARE WE AND WHERE WE'RE GOING

MacMillan, N.Y.

Sociological portrait of nine distinct groups, some very poor, others very rich. In trying to understand who we are, we come to see a great deal about where we are going.

MITCHELL, R.B.; RAPKIN, C.; (1954): URBAN TRAFFIC: A FUNCTION OF LAND USE

Columbia University Press, N.Y.

Takes a view of the city, as a 'system that works'.

MORGAN, M.G. (ed); (1975): ENERGY AND MAN
Technical and Social Aspects of Energy

I.E.E.E. Press, N.Y.

MORSENA, D.; (1977): SITE DESIGN: CAN IT REALLY SAVE ENERGY

in Planning (ASPD), Dec. 1977, pp 2.

MUELLER, Peter; (1977): ON THINGS NUCLEAR; THE CANADIAN DEBATE

Canadian Institute of International Affairs.

Balanced summary of the nuclear issue.

MURRAY, Austin C.; (1974): THE EVALUATION OF URBAN PUBLIC FACILITY LOCATION - AN ALTERNATIVE TO COST-BENEFIT ANALYSIS

in Geographical Analysis, April 1974.

NAISBITT, John; (1983): MEGATRENDS

Warner Books, N.Y.

Synopsis of some 5,600 articles in North America to extract the 10 most commonly agreed trends for the continent.

NATIONAL RESEARCH COUNCIL; (1978): MEASURES FOR ENERGY CONSERVATION IN NEW BUILDINGS

Associate Committee on the National Building Code, NRC, Ottawa.

von NEUMAN, J.; MORGENSTERN; (1944): THEORY OF GAMES AND ECONOMIC BEHAVIOUR

Princeton University Press.

Neutze, G.M.; (1968): ECONOMIC POLICY AND THE SIZE OF CITIES

Aug., M. Kelly, N.Y.

(No Author); (1981): WHAT DO PEOPLE DO DOWNTOWN?

Project for Public Spaces Inc., Jan. 1981.

O'NEILL, G.K.; (1981): 2081: A HOPEFUL VIEW OF THE HUMAN FUTURE

Simon and Schuster, N.Y.

Part I: The Art of Prophecy (critique of Kipling, Verne, Wells, Haldane, Clarke, Tsialkowski, Orwell, Huxley, Zamiatin, etc.).

Part II: The Drivers of Change: Computers, Automation, Energy, Space, Communications.Part III: Life in 2081: Space, Inner space, Homes, Highway in the Sky, etc.

OPHULS, W.; (1977): ECOLOGY AND THE POLITICS OF SCARCITY
W.H. Freeman, San Francisco.

O'TOOLE, J.; (1976): ENERGY AND SOCIAL CHANGE
MIT Press, Cambridge, Mass.

PARETO, Vilfredo; (1971): MANUAL OF POLITICAL ECONOMY
translated by Anne S. Schwier, A.M. Kelly, N.Y. (1971).

PAUKER, Guy J.; (1974): CAN LAND USE MANAGEMENT REDUCE ENERGY CONSUMPTION FOR TRANSPORTATION?
Rand Corp., Santa Monica, California.

PORTLAND BUREAU OF PLANNING; (1977): ENERGY CONSERVATION CHOICES FOR THE CITY OF PORTLAND: Vol. 6, Project Overview

PECCEI, Aurelio; (1981): ONE 100 PAGES FOR THE FUTURE
U.S. Association for the Club of Rome (N.Y.).

PRED, A.; (1967): BEHAVIOUR AND LOCATION
Lund Studies in Geography, Part 1, Series B, Human Geograhy No. 27.

PRIEST, N. Curtiss et al; (1976): AN OVERVIEW AND CRITICAL EVALUATION OF THE RELATONSHIPS BETWEEN LAND USE AND ENERGY CONSERVATION
Volume 1

Technology and Economics Inc.,
Cambridge, Mass.

PRINCETON UNIVERSITY; (1969): PLANNING AND DESIGN WORKBOOK FOR COMMUNITY PARTICIPATION

Princeton University, School of Architecture and Urban Planning

HT 166 P65 1969

RICHARDSON, J.M.; (ed); (1982): MAKING IT HAPPEN A POSITIVE GUIDE TO THE FUTURE

U.S. Association for the Club of Rome.

Life is full of choices and the more information we have about the consequences of each, the better we are likely to choose.

ROBERTS, J.S.; (1975): ENERGY AND LAND USE: Analysis of Alternative Development Patterns

in Environmental Comment, pp 225-236.

SANT, Roger; (1981): THE LEAST COST ENERGY STRATEGY AND CANADA

Applied Energy Services Inc.,
Arlington, Virginia.

SCOTT, A.J.; (1971): AN INTRODUCTION TO SPATIAL ALLOCATION ANALYSIS

Association of American
Geographers, Washington.

SCIENCE COUNCIL OF CANADA; (1977):
CANADA AS A CONSERVER SOCIETY: RESOURCE UNCERTAINTIES AND THE NEED FOR NEW TECHNOLOGIES

Supply and Services, Canada (Ottawa), Report 27.

SCHON, Donald; (1967):
TECHNOLOGY AND CHANGE
The New Herdclitus

Dell Publishing Co., N.Y.

SCHUMACHER, E.F.; (1975):
SMALL IS BEAUTIFUL: ECONOMICS AS IF PEOPLE MATTERED

Harper and Row, N.Y.

SEWELL, Derrick W.R.; FOSTER, H.D.;
ANALYSIS OF THE UNITED STATES'(1980):EXPERIENCE IN MODIFYING LAND USE TO CONSERVE ENERGY

W.P. No. 2, Lands Directorate, Department of the Environment, Ottawa, 1980.

Detailed study of Portland, Oregon, and Linclon, Nebraska with particular emphasis on the reaction to change within the communities and an identification of the interest groups involved. Catalogue EN 73-42/e.

SEWELL, W.R.D.; FOSTER, H.D.; (1980):
ENERGY CONSERVATION THROUGH LAND USE PLANNING

A synthesis of discussions in Montreal, March 26-28, 1980. Environment Canada (Lands Directorate).

SIEGEL, E. (ed); (1982):
THE FUTURE OF VIDEOTEXT

TRAC, Washington, D.C.

Evolution and present status; International perspective; advantages and disadvantages compared with print and TV; Technology; Viable services; Future development.

SIMON, Julian L.; (1981): THE ULTIMATE RESOURCE

Princeton University Press,
Princeton.

Immigrants are the best boon to a country because the human mind being the ultimate resource, immigrants are at a pressure to do and think to their utmost.

SINGER, J.F. and McCOY, M.A.; (1979): HOW TO AUDIT COMMUNITY ENERGY USE

in Practising Planner, Vol. 9,
No. 2, (June '78).

SMYTH, Ian; (1983): ENERGY SUPPLY AND PRICING OIL - The Next 10 Years

Lecture of New Neighbourhood
Convention, Toronto (Jan. 31 -
Feb. 4, 1983).

SOLOMON, Michael; (1983): FUTURE LIFE

MacMillan, N.Y.

Eighteen essays provide insight into the contribution of medicine. Several predictions of discoveries include the cure of cancer (1990), alleviation of fear and guilt (2000), improved methods of learning (1985), control of obesity (1990), alleviation of mental illness (1990).

SPECIAL COMMITTEE ON ENERGY; (1982): THE ENERGY BRIEF
ENERGY ALTERNATIVES

Supply and Services, Canada, Ottawa.

it is a matter of time. Their effective use would be in the industrial, transportation and residential sectors. Environmental impacts will not be a constraint. Energy conservation is the most attractive option because it could eliminate one third of the total need over the next 20 yaers.

STEADMAN, Philip; (1977): ENERGY AND PATTERNS OF LAND USE

Journal of Architectural Education,
No. 30; February 1977, 62.

THOMPSON, J.D.; (1967): ORGANIZATIONS IN ACTION

McGraw Hill, N.Y.

TOFFLER, A.; (1980): THE THIRD WAVE

William Morrow and Co., N.Y.

First wave: agriculture 10,000 years ago. Second: industry 300 years ago. Third, ideas production at home. Computer cottage industry change in family life - breakdown of poor marriages but reinforcemnt of stronger ones. Revolution in government style likely towards decision making away from national centres - internationally and regionally. Increased participation. Technology will loose its 'Standardizing' effect by virtue of people choosing options offered by it, rather than blindly adopting whatever seems 'advanced'.

TRAC; (1979): NEW COMMUNICATION AND INFORMATON TECHNOLOGIES - Their Application to Individual and Community Uses

Department P. BOX 12038, Washington D.C.

Report on two-day meeting of 25 media reformers. Implications of the technological revolution.

URBAN LAND INSTITUTE: (1974): ENERGY AND LAND USE - A Statement by the ULI

Environmental Comment, Sept. 1974.

U.S. DEPARTMENT OF ENERGY; (1976): GUIDELINES FOR TRAVEL DEMAND ANALYSES OF PROGRAM MEASURES TO PROMOTE CAR POOLS, VAN POOLS AND PUBLIC TRANSPORTATION

Cambridge Systematics Inc., Mass., Washington D.C., November '76.

VALASKAKIS K.; SMITH, J.G.; SINDELL, P.S; FITZPATRICK-MARTIN, I; (1979): THE CONSERVER SOCIETY; A WORKABLE ALTERNATIVE FOR THE FUTURE

Harper and Row, N.Y., ($19.50 hard cover; $6.50 soft cover).

Sets out three scenarios of conservation requiring varying degrees of change in lifestyles and values. Argues for an aware, conserving lifestyle which, the authors believe, can be accepted by North American in the foreseeable future.

VAN TIL, Jon; (1979): SPATIAL FORM AND URBAN STRUCTURE IN A POSSIBLE URBAN FUTURE
Some implications of energy shortfall for urban planning

WATSON, R.L.; (1973): PHASING GROWTH HOW FAST? WHERE NEXT?

in *New Towns in America* (edited by J. Bailey), pp 87-89.

WEBBER, M.M.; (1964): EXPLORATIONS INTO URBAN STRUCTURE

University of Philadelphia Press, Philadelphia.

WINDHEIM, L.S.; WODDER, R.R ; (1976): CITIES AS ENERGY SYSTEMS

Building Systems Design '73, Feb/March '76 issue; pp 9-30.

YARNAZONE, V.; (1974): ENERGY CRISIS: DANGER AND OPPORTUNITY

West Publishing Co., St. Paul.

ZAELKE, K.J.; (1977): SAVING ENERGY IN URBAN TRANSPORTATION

Bellinger Publishing Co. 1977, Cambridge, Mass.

GA:jac-2
B2D003

Community Development Patterns and Energy Conservation

---

by Woods Gordon et. al., 1982
published by Ministry of Municipal Affairs and Housing.

The objectives may be summarized as:-

1) Determine planning directions towards conserving settlement patterns;
2) Quantify the relationship between land use and energy consumption;
3) Measure impact of adopting new directions (1)

Key findings:-

- London and Peterborough could save an estimated 4% by the year 2001 if conserving patterns were adopted. This means $25 million per year for London (population: 200,000) $4 million for Peterborough (population: 50,000).
- Gains were highest in:-
  1) Industrial transportation
  2) Service transportation
  3) Residential transportation

The methodology involved:-

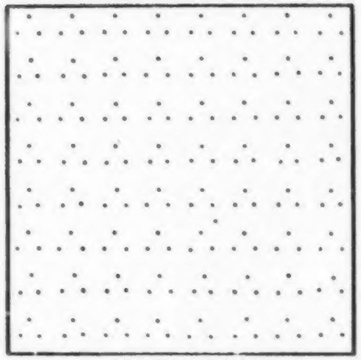
a) Identification of existing settlement patterns.
b) Development of an Energy Profile.
c) Quantification of land use/energy relationships.
d) Development of an evaluation matrix.

Future Directions

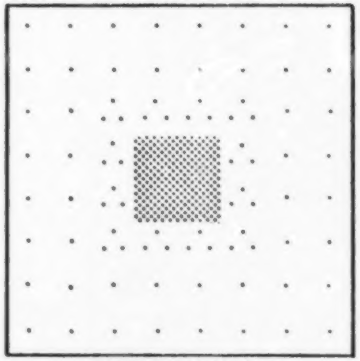
Energy savings thorough the modification of urban form could lead to multiplier effects throughout a city.
Questions to be clarified include:-

- Costs and benefits
- Refinement of energy consumption indices
- Land intensity/distribution patterns
- Effect of urban size
- Refinement of transportation impacts.

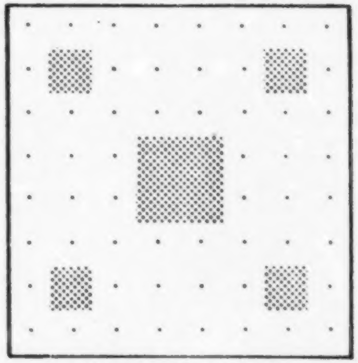
HYPOTHETICAL EXAMPLES OF URBAN FORM



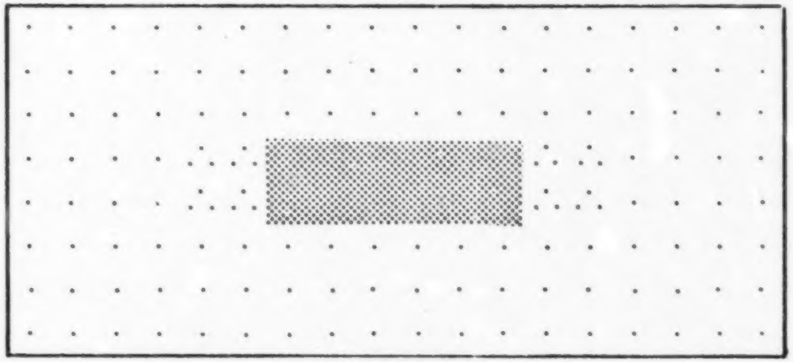
COMPLETELY
DISPERSED



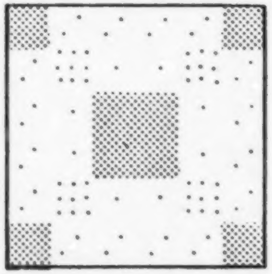
CORE DOMINANT
(SINGLE NODE)



CORE & SUB-CENTRES
(MULTI-NODAL)



CORRIDOR SHAPE
(SINGLE NODE)



MULTI-CENTRED
COMPACT

SOURCE: Woods Gordon

Factors related to energy in a community:-

1) Land use relationships
2) Densities (intensities) of use
3) Role strength and size of core area
4) Location and density of residential area
5) Road and highway patterns
6) Location of major employers (employment centres)
7) Location of major commercial areas
8) Location of other traffic generators
9) Size and scale of community
10) Rate of Traffic flow.

Stages of the 9-month study:-

I Literature Review - Case Study Selection

II Development Pattern/Energy Use Assessment

III Conservation Opportunity Identification

IV Scenario Development

V Final Report

Stage I indicated that there was little research available.

Stage II revealed the following patterns:-

- Intense land use requires: Density, concentration, compactness and containment.

- Density saves heating costing energy - about 30% and above all, transporation energy through influence on mode and distance of travel.

- Concentration increases activity by focusing it onto a complex of facilities, thereby easing interaction and saving transportation energy. Additionally, it enhances prospects for district heating and community solar heating.

- Compactness refers to shape of urban form - a linear city is considered less compact than a circular one.

- Containment requires a precise boundary to restrict development beyond it, in order to ensure more efficient land use and infrastructure.

INTENSITY OF LAND USE

METHODOLOGY FOR CALCULATION OF ENERGY USE

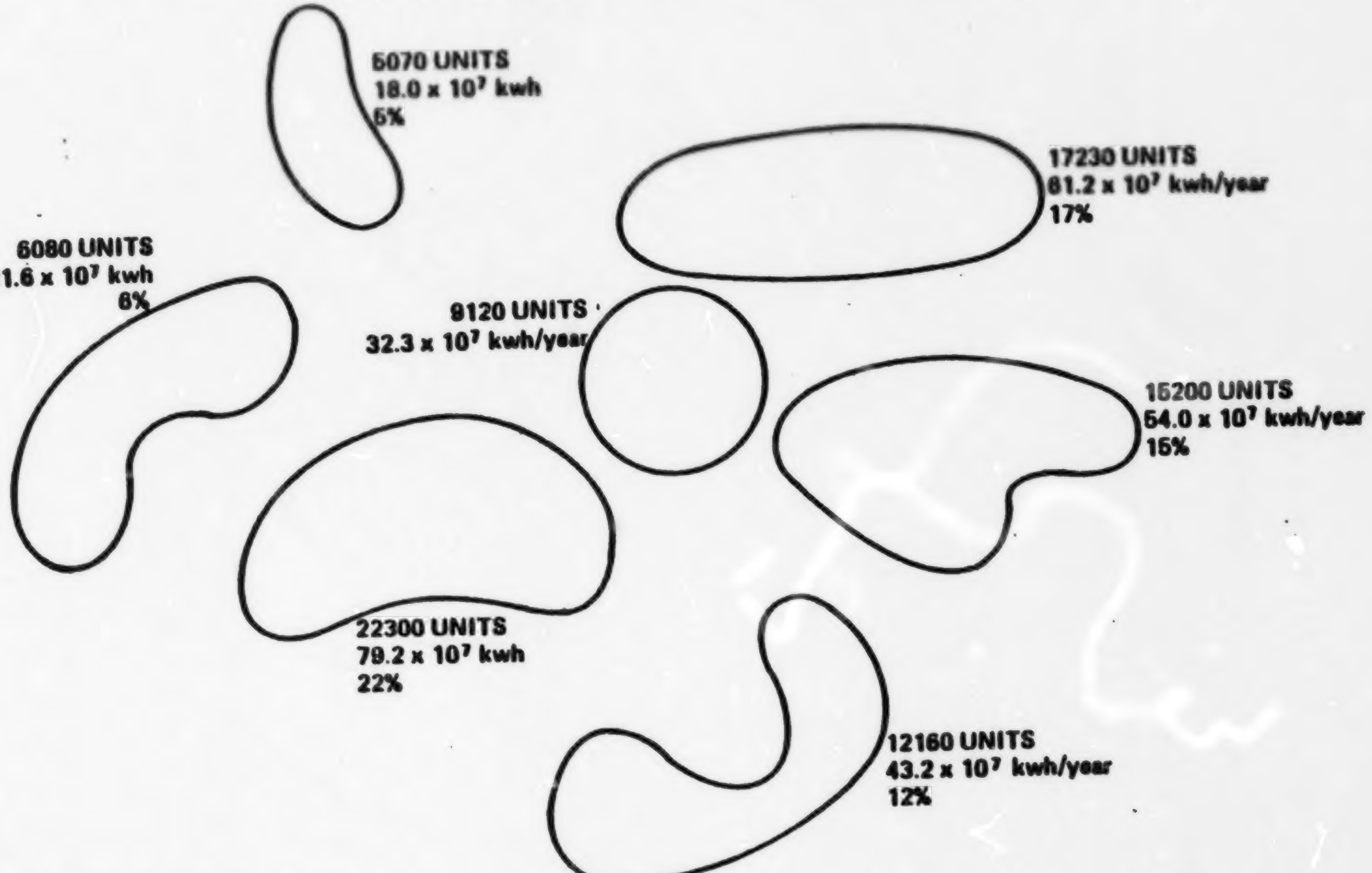
SECTOR ↓	BASE DATA ↓		ENERGY INDICES		ENERGY (KWH)
RESIDENTIAL	UNITS • BY TYPE	x		=	
RETAIL	FLOOR SPACE • BY BUILDING TYPE	x		=	
SERVICE	EMPLOYMENT	x		=	
INDUSTRIAL	EMPLOYMENT • BY INDUSTRY TYPE	x		=	

FIGURE 9

CITY OF LONDON

RESIDENTIAL ENERGY USE

1981 – 101365 UNITS
– TOTAL ANNUAL ENERGY CONSUMPTION = 359.7 x 10^7 kwh
– AVERAGE CONSUMPTION PER UNIT PER YEAR = 35500 kwh


5070 UNITS
18.0 x 10⁷ kwh
5%
17230 UNITS
61.2 x 10⁷ kwh/year
17%
6080 UNITS
21.6 x 10⁷ kwh
6%
9120 UNITS
32.3 x 10⁷ kwh/year
15200 UNITS
54.0 x 10⁷ kwh/year
15%
22300 UNITS
79.2 x 10⁷ kwh
22%
12160 UNITS
43.2 x 10⁷ kwh/year
12%

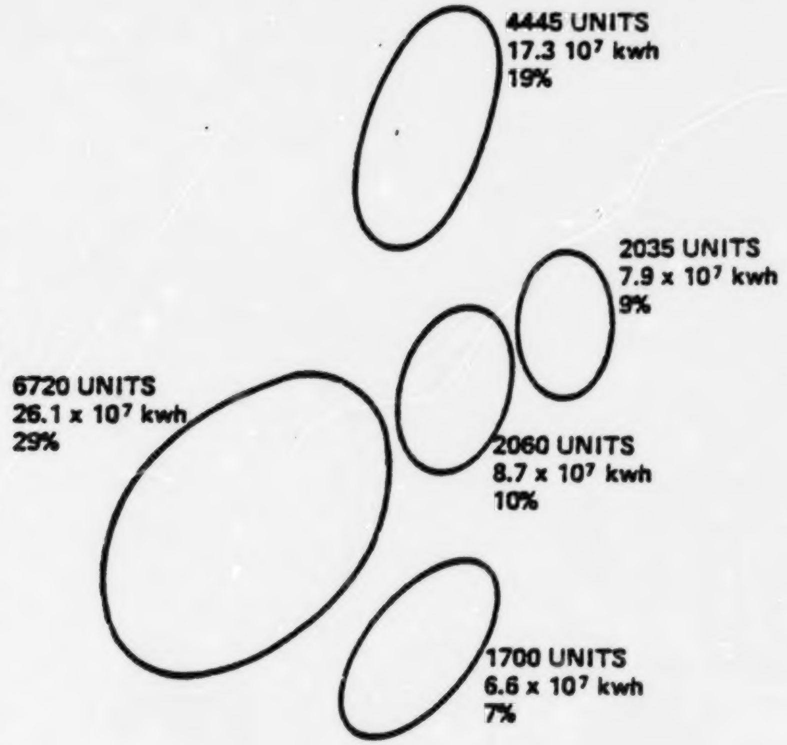
SOURCE: Enerplan, Woods Gordon

FIGURE 10

CITY OF PETERBOROUGH

RESIDENTIAL ENERGY USE

1981 — 23145 UNITS
— TOTAL ANNUAL ENERGY CONSUMPTION = 90.0 x 10⁷ kwh
— AVERAGE ANNUAL ENERGY CONSUMPTION PER DWELLING = 38900 kwh


4445 UNITS
17.3 10⁷ kwh
19%
2035 UNITS
7.9 x 10⁷ kwh
9%
6720 UNITS
26.1 x 10⁷ kwh
29%
2060 UNITS
8.7 x 10⁷ kwh
10%
1700 UNITS
6.6 x 10⁷ kwh
7%

SOURCE: Enerplan, Woods Gordon

FIGURE 1

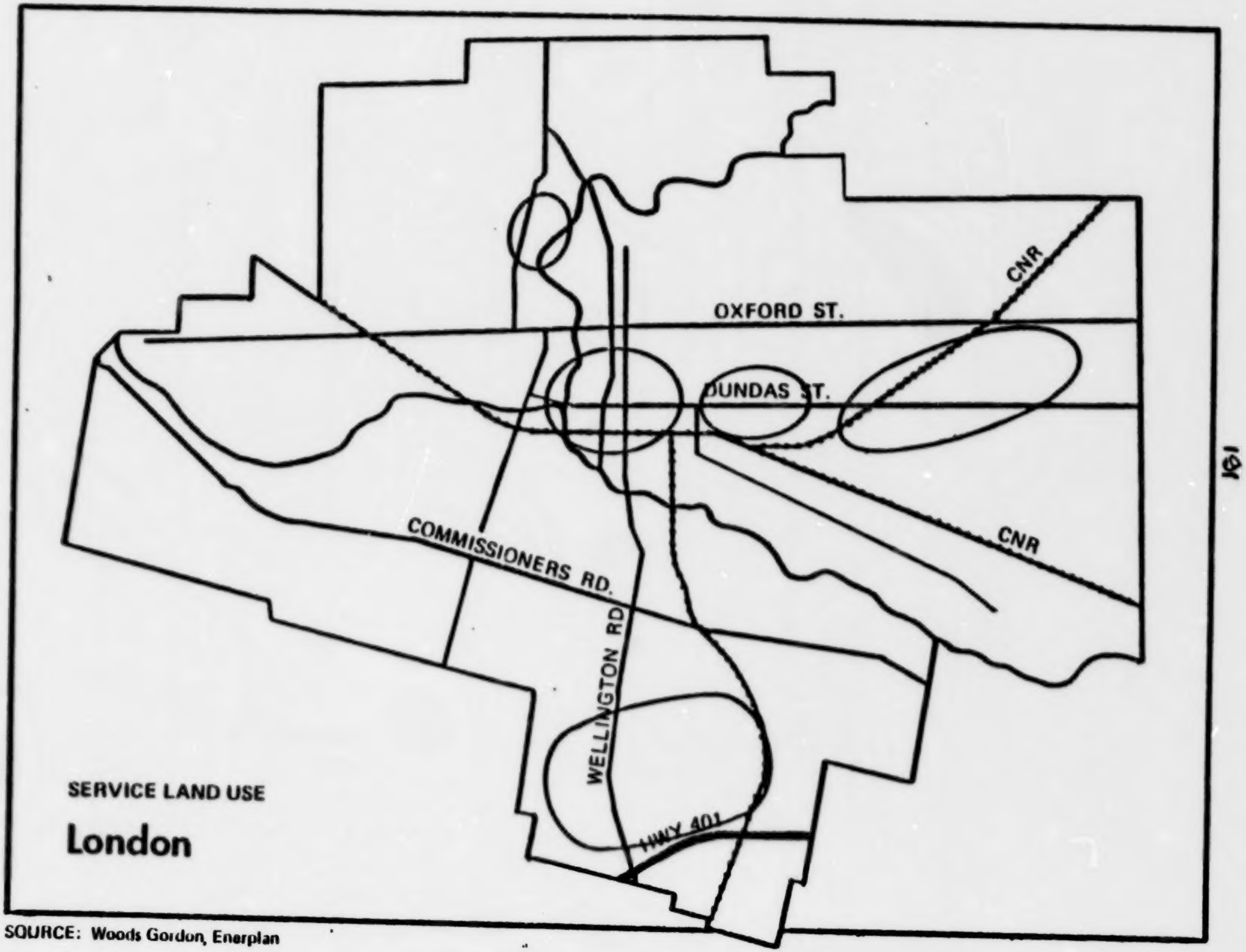
INTENSITY/DISTRIBUTION MATRIX

INTENSITY OF DEVELOPMENT

DISTRIBUTION OF DEVELOPMENT

RESIDENTIAL			LOW	MEDIUM		HIGH
	COMM.		LOW		MEDIUM	HIGH
		IND.	LOW			MEDIUM
DISPERSED	DISPERSED	DISPERSED				
	CORE AND DISPERSED					
SOME NODES	CORE DOMINANT	NODAL				
NODAL	NODAL					

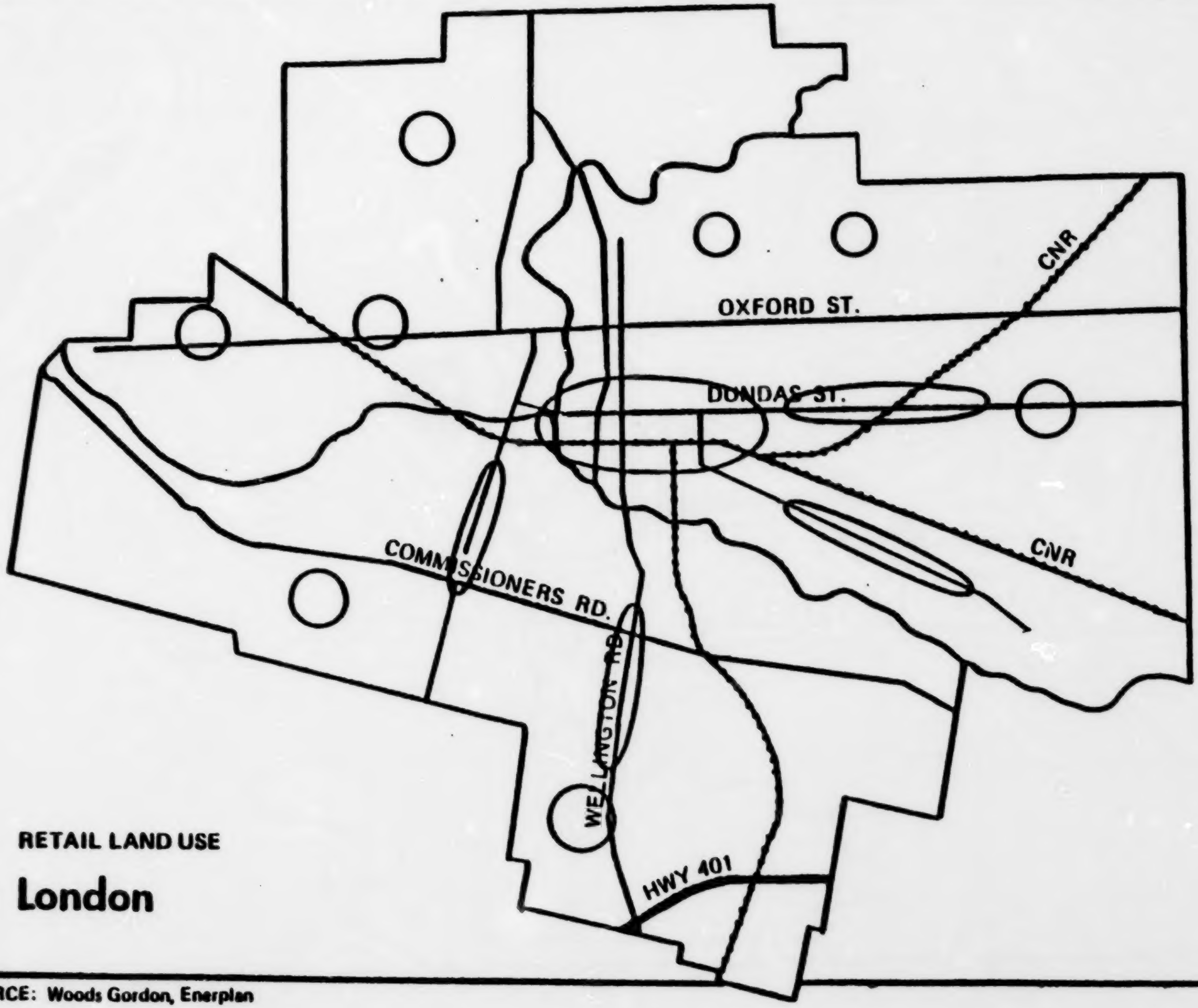
SOURCE: Woods Gordon, The Starr Group, Enerplan


OXFORD ST.
DUNDAS ST.
CNR
CNR
COMMISSIONERS RD.
WELLINGTON RD
HWY 401

SERVICE LAND USE

London

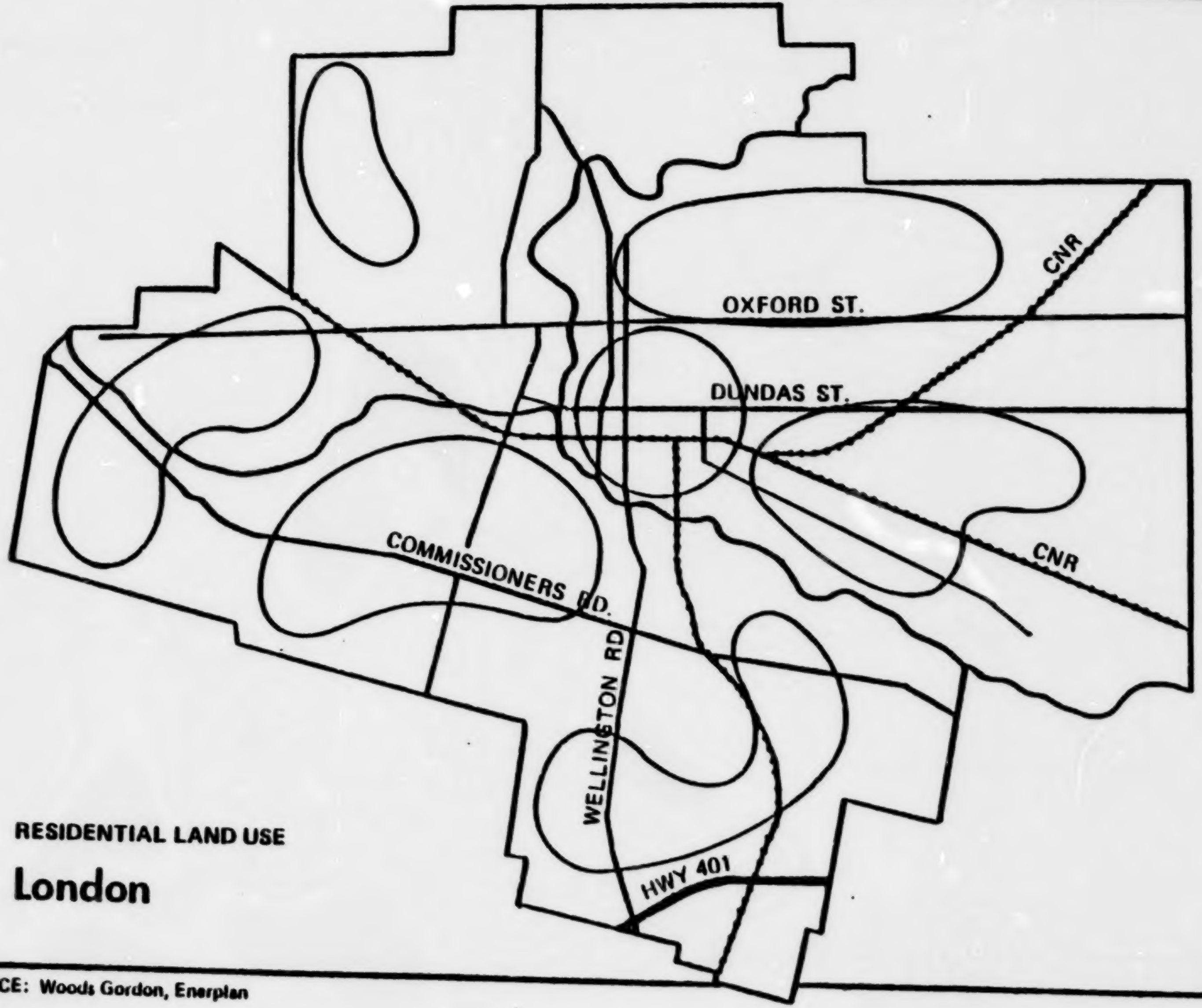
SOURCE: Woods Gordon, Enerplan


CNR
OXFORD ST.
DUNDAS ST.
CNR
COMMISSIONERS RD.
WELLINGTON RD.
HWY 401

RETAIL LAND USE

London

SOURCE: Woods Gordon, Enerplan


CNR
OXFORD ST.
DUNDAS ST.
CNR
COMMISSIONERS RD.
WELLINGTON RD.
HWY 401

RESIDENTIAL LAND USE

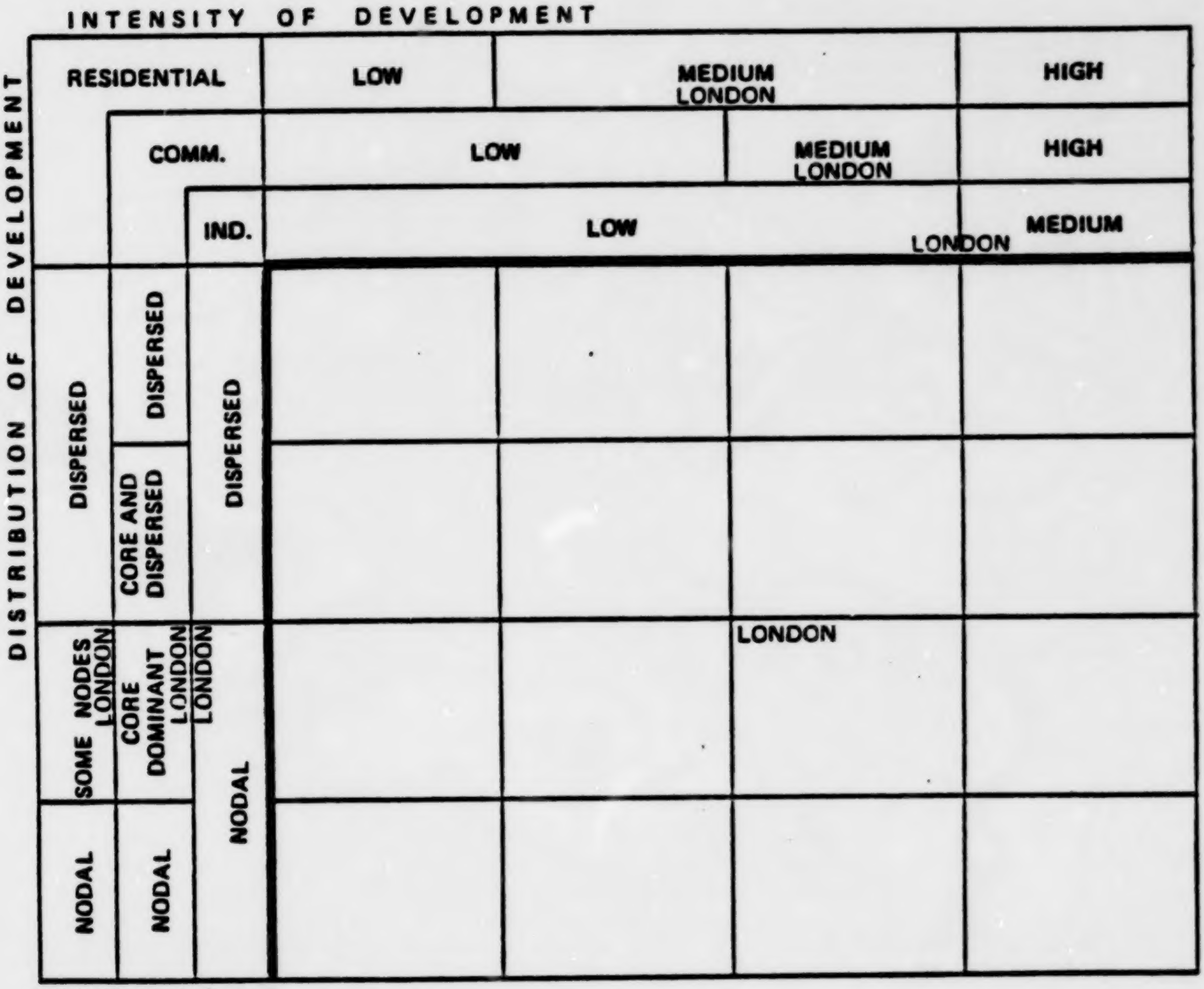
London

SOURCE: Woods Gordon, Enerplan

FIGURE 3

INTENSITY/DISTRIBUTION MATRIX

Placement of London


INTENSITY OF DEVELOPMENT
DISTRIBUTION OF DEVELOPMENT
RESIDENTIAL
LOW
MEDIUM
LONDON
HIGH
COMM.
LOW
MEDIUM
LONDON
HIGH
IND.
LOW
LONDON
MEDIUM
DISPERSED
SOME NODES
LONDON
NODAL
DISPERSED
CORE AND DISPERSED
CORE DOMINANT
LONDON
NODAL
DISPERSED
LONDON
NODAL
LONDON

SOURCE: Woods Gordon

"Energy eficient distribution of urban activities requires careful clustering of land uses consistent with the nature of urban economic relationships."

Gary Armen's interpretation of the above:-

"Energy efficient distribution of activities depends on clustering which maximizes the convenience of social and economic interaction between them."

Methodology for quantifying land use/energy relationships:-

1. Identifying key land use variables impacting on energy consumption.
2. Determining current values for these variables in the community.
3. Projecting future change 1981-2001.

Sector	Variable Intensity of land use	Base Data
Residential	Dwelling Units	Single Semi Row Apartment
Commercial	Floorspace	Service Retail
Industrial	Employment	Light Industry Medium Industry Heavy Industry
	Distribution of land use	
Transportation	Work trips Average trip length Average speed Vehicle efficiency	

These variables were translated into energy indices through the application of consumption indices for each - e.g:-

(Type of residential unit) x (Energy index) = Energy consumed (KWH)

(Service employment) x (Energy index) = (KWH)

On this basis, the 1981 energy profiles of London and Peterborough were approximated as follows:-

Land Use	London	Peterborough
Residential	33%	40%
Retail	5%	5%
Service	20%	15%
Industrial	36%	36%
Work Trips	7%	4%
Total	100%	100%

Projections to 2001 were carried out on the basis of the following assumptions:

ASSUMPTIONS

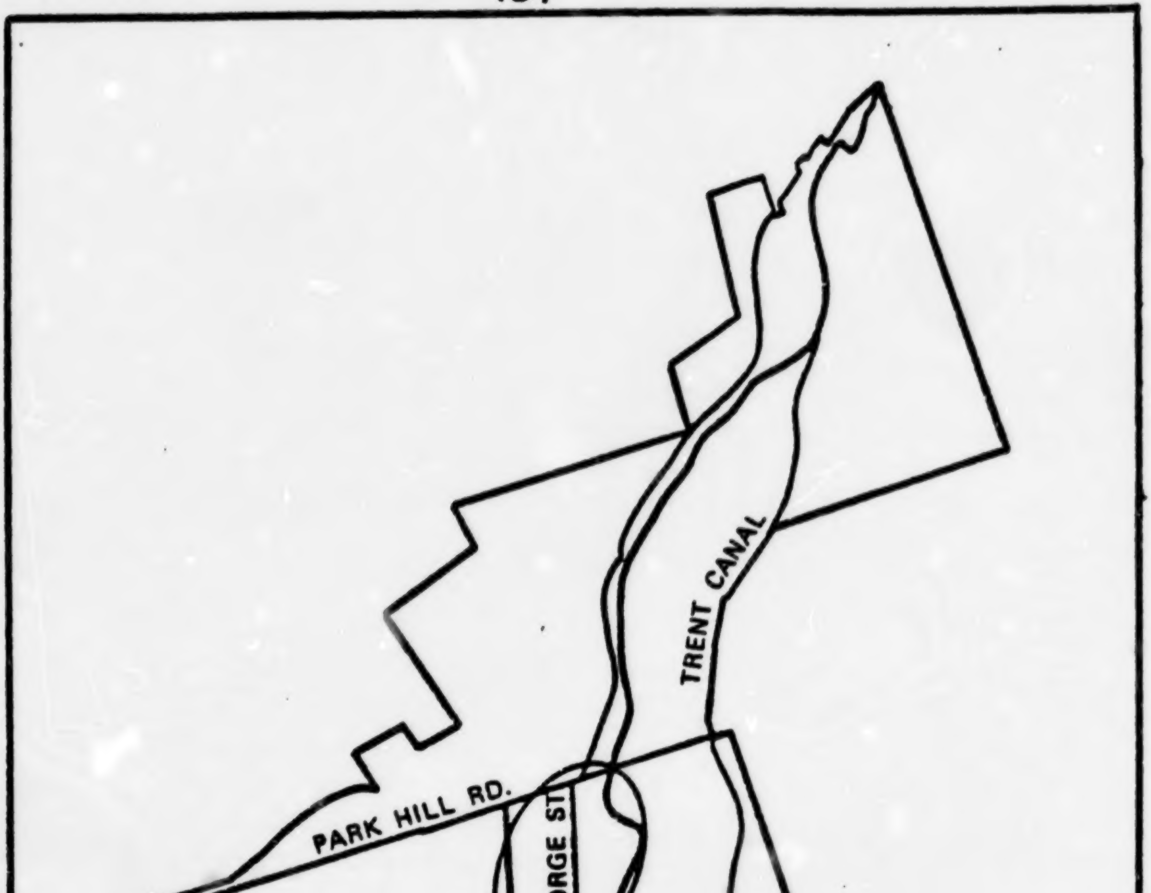
Intensity of Land Use

- Energy use depends on projected levels of activity and the energy use index of each sector
- Projected activity is estimated by official plan designation and policies
- Projected activity is based on a continuation of current and anticipated economic trends (eg. service sector employment growing faster than manufacturing)
- Energy consumption indices are modified slightly to account for changes in activity by type (eg. residential units by type and age, industrial employment by type of industry).

Distribution of Land Use

- Work trips increase directly in proportion with employment increase
- Trip length grows by 15% between 1980 and 2001 (based on recent trends and future expectations)
- Average speed is held constant
- Vehicle fuel efficiency is held constant

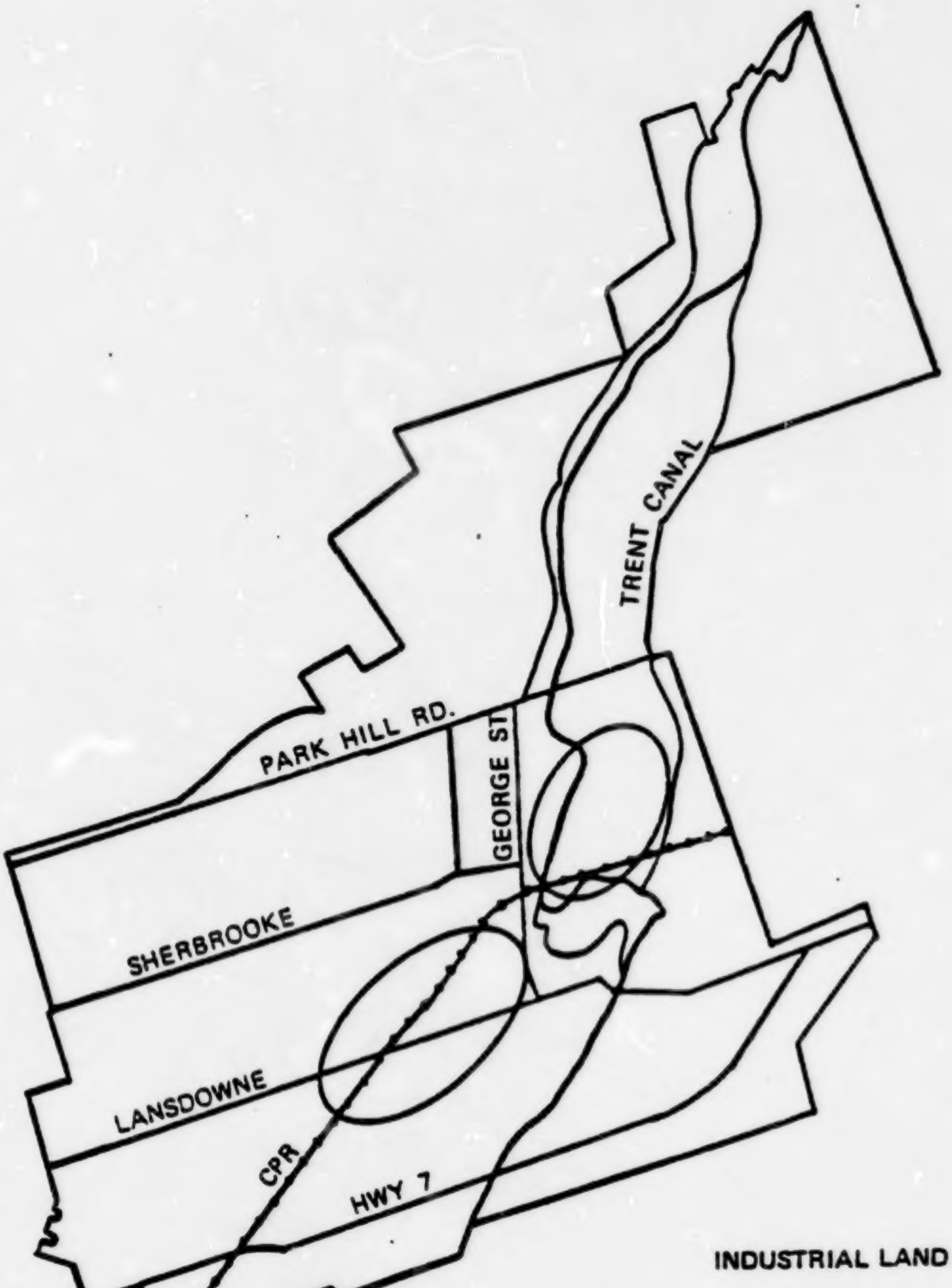
Applied to appropriate sectors and on the pattern of land uses projected in official plan policies adopted by the two cities it was established that London's energy consumption would rise by 40% and Peterborough by 27%. These were called TREND PROJECTIONS.


PARK HILL RD.
GEORGE ST
TRENT CANAL
SHERBROOKE
LANSDOWNE
CPR
HWY 7

SERVICE LAND USE

Peterborough

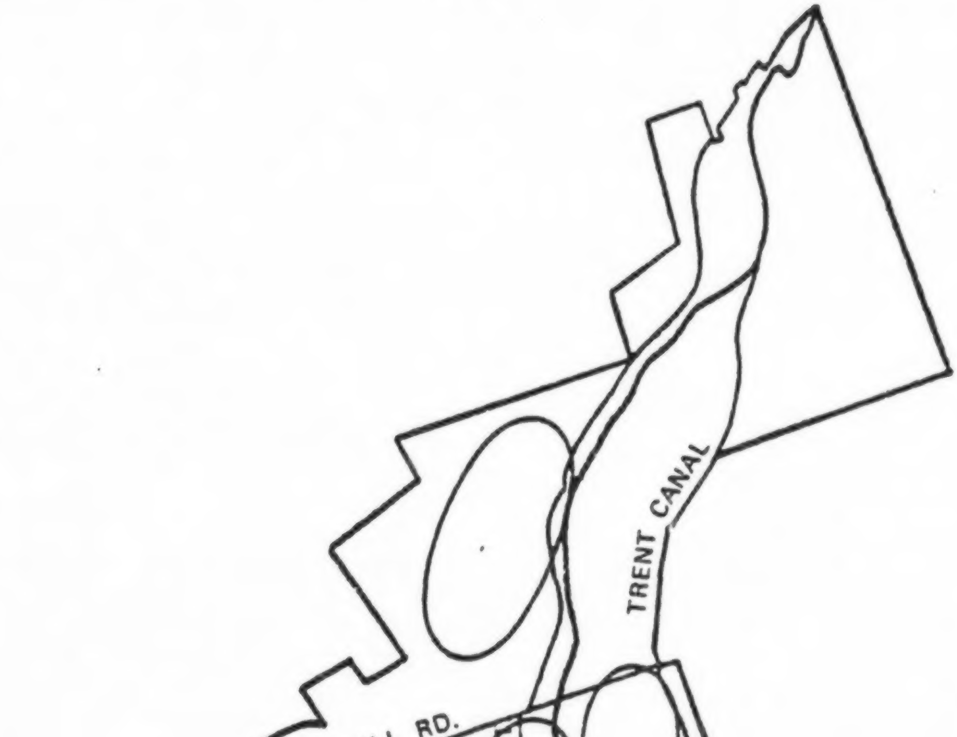
SOURCE: Woods Gordon, Enerplan


TRENT CANAL
PARK HILL RD.
GEORGE ST
SHERBROOKE
LANSDOWNE
CPR
HWY 7

INDUSTRIAL LAND USE

Peterborough

SOURCE: Woods Gordon, Enerplan


PARK HILL RD.
GEORGE ST.
TRENT CANAL
SHERBROOKE
LANSDOWNE
CPR
HWY 7

RESIDENTIAL
LAND USE
Peterborough

SOURCE: Woods Gordon, Enerplan

Scenaria were now developed for 2001 to identify planning measures which would place the community in a stronger position on the intensity/distribution aspect of land use. The feasibility of these measures were then tested for each city and the following Evaluation Matrix established:

	CRITERIA						
APPROACH	**DEMOGRAPHIC**	**PHYSICAL**	**ECONOMIC**	**SOCIAL**	**LEGAL**	**TOTAL SCORE**	**RANKING**
INTENSITY OF LAND USE							
DISTRIBUTION OF LAND USE							

Scoring on this matrix (plus, minus, zero or N.A.) was by consensus of the Project Team, as follows:-

> A community with: aging population, declining household, size rising proportion of non-family households -
> scored plus in 'Domographic' for raising residential densities in the 'Intensity of Land Use' square of the matrix.

FIGURE 5

INTENSITY/DISTRIBUTION MATRIX

Placement of Peterborough

INTENSITY OF DEVELOPMENT

DISTRIBUTION OF DEVELOPMENT

<table>
<tr><td colspan="3">RESIDENTIAL</td><td>LOW
PETERBOROUGH</td><td colspan="2">MEDIUM</td><td>HIGH</td></tr>
<tr><td rowspan="2"></td><td colspan="2">COMM.</td><td colspan="2">LOW
PETERBOROUGH</td><td>MEDIUM</td><td>HIGH</td></tr>
<tr><td></td><td>IND.</td><td colspan="3">LOW
PETERBOROUGH</td><td>MEDIUM</td></tr>
<tr><td rowspan="2">DISPERSED
PETERBOROUGH</td><td>DISPERSED</td><td rowspan="2">DISPERSED</td><td></td><td></td><td></td><td></td></tr>
<tr><td>CORE AND
DISPERSED
PETERBOROUGH</td><td>PETERBOROUGH</td><td></td><td></td><td></td></tr>
<tr><td>SOME NODES</td><td>CORE
DOMINANT</td><td rowspan="2">PETERBOROUGH
NODAL</td><td></td><td></td><td></td><td></td></tr>
<tr><td>NODAL</td><td>NODAL</td><td></td><td></td><td></td><td></td></tr>
</table>

SOURCE: Woods Gordon

The list of criteria were as follows:

Demographic

- population size
- household size
- age distribution

Physical

- concentration of development
- existing building conditions
- capacity and condition of existing hard services

Economic

- employment base and trends
- housing market
- energy prices

Social

- acceptance of mixed use development
- household energy consumption behaviour

Institutional and Legal

- Government incentives

The approaches towards energy efficiency were broadly categorized as follows:-

Intensity of Land Use

- Encourage higher densities
- Encourage infill development
- Minimize highway strip development

Distribution of Land Use

- Encourage mixed-use development
- Encourage self-contained neighbourhoods
- Develop transit corridors

This structured approach improved the consistency of evaluation outcomes, which in the case of the cities studied were as follows:-

LONDON

- Encourage Mixed Use Development
- Enourage the Emergence of Multi-Use Centres
- Encourage Core-Area Housing
- Raise Permitted Residential, Commercial and Industrial Densities
- Encourage Multi-Use Buildings
- Encourage the Development of Transit Corridors

PETERBOROUGH

- Encourage Core Area Housing
- Emphasize Infill Development
- Encourage Nodal Concentrations of Development
- Permit Residential Conversions

This should be the first step in Official Plan amendment/preparation towards greater energy-efficiency. This structured examination and discussion of issues encourages a conscious and consistent approach to planning.

In the case of London and Peterborough, revised land use plans were compared to the Official ones and energy consumption (using indices, etc) derived for CONSERVATION SCENARIA by 2001. In 1982 values, London could save $25 million per year and Pet'gh $5 million (about 4% each) Chief source of savings: Transportation, higher residential density, commercial activity, industrial land-use intensity. Multiplier effects of these savings could not be evaluated.

Comment This study provided insight as to where the research on "Enery Use and Land Use Patters in the City" fitted in the broad picture of energy-efficient land use planning. It was interesting to note for example that 4 out of 6 planning measures recommended in the study to make London energy efficient by 2001, were related to land use patterns, as follows:

1. Encourage Mixed-use development
2. Encourage Multi-use centres
3. Commercial densities
4. Multi-use buildings

Considerable insight was also provided on the process of Official Plan preparation - particularly on the initial stages. While the measures and techniques recommended in the study are products of pure logic, making them part of a community involvement process is the real challenge.

GA:pg-3
A2B084

POOR

QUALITY

ORIGINAL